MECHANICAL HANDLING

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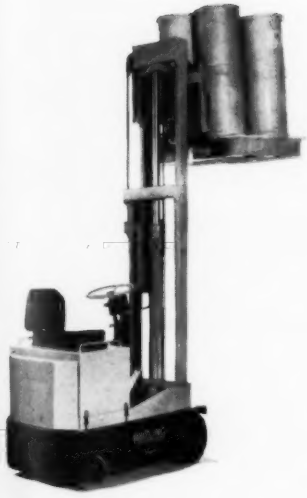

SOLVING A HANDLING PROBLEM

WHEN at any time that you prepare to solve a handling problem in your works, one important point must be remembered—do not expect one kind of equipment to be suitable throughout your plant. The first matter to decide is obviously how you are going to solve the problem, and then what mechanical handling equipment is necessary. Choosing the right equipment is a most important decision. As we have mentioned many times in these pages, nothing is more annoying to look at than well-made mechanical handling equipment lying idle and unused because someone did not think carefully enough before making the purchase.

Broadly there are three classes of equipment which may be considered, when considering the selection of equipment:—

1. fixed equipment, i.e. gantry cranes, conveyors, chutes, and elevators;
2. mobile equipment, i.e. mobile cranes, lifting and platform trucks,
3. special-purpose equipment, such as positioning and lifting appliances.

It must again be stressed that these are very broad divisions of equipment, but they should be able to start any good materials handling engineer thinking. Make detailed lists of equipment, and strike out those that would be no help. In other words strike out until you arrive at 'a short list' of suitable equipment.

Then the cost factor must be considered, to establish the ultimate figure of your handling methods. Not only must the cost of the equipment be included but the cost of the operatives working the appliances.

*'When a materials handling engineer prepares a project, he must start off with the promise that should it receive management approval, unless otherwise dictated, his responsibility does not end until the plan is in full operation. He is wise to notify management as and when the economies are actually achieved, and if the implementation of the project is of a protracted nature, fears of its ultimate completion and success are avoided by the circulation of progress reports.

'Any project will only turn out as good as it is planned, but invariably when the time comes to match up the shop floor conditions with the theoretical planning, modifications and adjustments will have to be made.

'The engineer concerned must face up to this situation very realistically and must not let up until the plan is effectively established to the satisfaction of the people concerned; even then he would be unwise to adopt a complacent attitude towards his achievement, but should be ever on the look-out for improvements.'

A great help in solving a handling problem is of course reading the articles and case-histories in this journal. They might not be about your particular industry but they will give you ideas that you can adapt to your own particular conditions. At the time of the Mechanical Handling Exhibition great benefit can be obtained by paying a visit and seeing the huge display of equipment side by side for you to inspect and note its potential value to your firm.

Visits to other works are a great help particularly if handling the same type of merchandise as yourself. Write down in detail what you propose to do and check your details again and again. A really good handling scheme is worth a lot of careful thought.

* "Preparing a Materials Handling Project for Approval", by H. P. Mott, A.M.I.Prod.E., *Mechanical Handling*, August, 1953.

Pour les lecteurs de l'étranger
Für unsere ausländischen Leser
Para los lectores de ultramar

SUMMARY OF CONTENTS

For readers overseas

SOMMAIRE EN FRANÇAIS

Manutention automatique du bois page 642

Cet article décrit des machines qui sont conçues pour la manutention en vrac du bois scié, et pour le trier pour la longueur, les dimensions et la qualité. Il décrit en particulier une grosse machine qui a été installée à Londres et, qui, paraît-il, fait le travail normalement exécuté par 40 hommes.

Bureau de triage mécanique des colis de Leeds page 645

Par H. G. Vallings, A.M.I.Mech.E.

Cet article décrit ce que l'on croit être le bureau de triage de colis le plus fortement mécanisé d'Europe. Le système de manutention et de triage englobe plus de 1, 6 km de transporteurs à courroie et à chaîne, et peut se charger de plus de 10.000 colis à l'heure.

Eviers sur transporteurs page 656

Par D. M. Potter, B.A. (Oxon)

C'est la description d'un vaste système de transporteurs installé dans deux usines de la Leisure Kitchen Equipment, Ltd., où les éviers de cuisine, ainsi que d'autre matériel, sont fabriqués. Dans l'une de ces usines, les articles sont emboutis à forme et dans l'autre, on les recouvre d'émail vitreux.

Une brasserie manutentionne 'vides' et 'pleins' sans les mains page 667

Par A. G. Gandreau

Ayant modernisé ses ateliers de bouteilles et ses entrepôts pour palettiser ses opérations manuelles des bouteilles de bière, une brasserie de San Antonio, Texas, U.S.A. annonce qu'elle est la première brasserie transformée que l'on connaisse et pouvant se passer entièrement de manipulations ouvrières pour les cycles complets de fabrication et de stockage de la brasserie.

Le chargeur d'avions Dennis page 675

Cet engin, résultat de longues études et grand travail de mise au point chez Dennis Brothers, Ltd., apporte à la présente et future génération d'appareils un moyen efficace et sûr de manutention des charges d'avions.

Un corps de plateau est prévu, très bas, pour lever à une hauteur de 3m 65 (12 pieds) et un transporteur et pont à rouleaux facilitent la manutention de charges jusqu'à 5 tonnes de bagages de passagers, de fret ou de matériel d'entretien.

Système de transporteur à courroie de 8,8 km de long page 680

Le système de tranporteur à courroie à travers chams permanent le plus long du monde vient récemment dêtre mis en service en Oklahoma du Sud, aux U.S.A. Cette série de sept transporteurs traversant le pays sur 8,8 km de distance transportent 1,016 tonnes à l'heure

Le matériel anglais à l'étranger page 687

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INHALTSÜBERSICHT AUF DEUTSCH

Automatischer Bauholzumschlag Seite 642

In diesem Artikel werden Maschinen beschrieben, die zum massenweisen Verladen von Schnittholz konstruiert wurden und dieses nach Länge, Abmessungen und Güte sortieren. Insbesondere wird eine grosse Maschine beschrieben, welche kürzlich in London installiert wurde und die normalerweise von 40 Mann verrichtete Arbeit ausführen soll.

Mechanische Paketsortiererei in Leeds Seite 645

Von H. G. Vallings, A.M.I.Mech.E.

Im vorliegenden Artikel wird die wahrscheinlich modernste mechanisierte Paketversandstelle in Europa beschrieben. Die Umschlag- und Sortieranlage umfasst Transportbänder und Kettenförderer von insgesamt über 1,6 km Länge und kann über 10,000 Pakete die Stunde bewältigen.

Abwaschbecken per Förderer Seite 656

Von D. M. Potter, B.A. (Oxon)

Hier wird eine in zwei Fabriken der Firma Leisure Kitchen Equipment, Ltd., welche Küchenabwaschbecken und andere Küchenausrüstungen herstellt, vorhandene Grossförderanlage beschrieben. In der einen Fabrik werden die Artikel geformt und in der anderen einbrennlackiert.

Brauereibetrieb mechanisiert Flaschenfüllanlage Seite 667

Von A. G. Gandreau

Durch Palletisierung des Leerbehälter-

transportes in seinen Flaschenfüllanlagen und Lagerhäusern soll eine Brauerei in San Antonio, Texas, USA, der erste völlig mechanisierte Brauerei-betrieb sein, in welchem während der gesamten Brau- und Lager-vorgänge sämtliche Handarbeiten ausgeschaltet sind.

Der Dennis-Flugzeuglader Seite 675

Diese Maschine, das Resultat eingehender Forschungs- und Entwicklungsarbeiten der Firma Dennis Bros., Ltd., ermöglicht ein rationelles und zuverlässiges Beladen moderner Flugzeuge. Eine sehr niedrige Plattform kann bis zu 3,65 m Höhe gehoben werden, und ein Rollenförderer mit Brücke erleichtert das Verladen von Passagiergepäck, Fracht- und Wartungsausrüstungen bis zu 5 t Gewicht.

8,8 km lange Bandförderanlage Seite 680

Die längste Überland-Bandförderanlage der Welt wurde kürzlich im südlichen Oklahoma, U.S.A., in Betrieb genommen. Die sich aus 7 Bandförderern zusammensetzende Anlage erstreckt sich über 8,8 km Länge und hat eine Stundenleistung von über 1000 to.

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SUMARIO EN ESPAÑOL

Manipulación automática de maderas Pág. 642

Este artículo describe unas máquinas que han sido creadas para manipular en masa la madera serrada, así como para clasificarla según su longitud, sus dimensiones y calidad. Describe especialmente una gran máquina que ha sido instalada en Londres, y de la que se afirma que lleva a cabo el trabajo que normalmente ejecutan 40 hombres.

Oficina de clasificación mecánica de paquetes en Leeds Pág. 645

Por H. G. Vallings, A.M.I.Mech.E.

Descripción de lo que se cree ser la más altamente mecanizada oficina de paquetes de Europa. El sistema de manipulación y clasificación contiene más de 1,6 km de transportadores de cintas y de cadenas, siendo capaz de pasar más de 10.000 paquetes por hora.

Fregaderos por transportador Pág. 656

Por D. M. Potter, B.A.(Oxon.)

Viene aquí una descripción de un extenso sistema de transportadores instalado en dos fábricas de Leisure Kitchen Equipment, Ltd., en que se producen fregaderos de cocina y otros equipos. Estos pasan por las prensas que les dan su forma en una de las fábricas, mientras en la otra fábrica reciben esmalte vítreo.

Manipulación de vacíos y llenos en una fábrica de cerveza sin intervención de las manos Pág. 667

Por A. G. Gandreau

Habiendo modernizado sus secciones de botellas y almacenes, con instalación de bandejas en lugar de manipular los envases de cerveza a mano, una fábrica de cerveza de San Antonio, Texas, U.S.A., afirma que es la primera fábrica de cerveza así convertida que prescinda de toda manipulación manual en todos los ciclos de fabricación y almacenaje de cerveza.

El cargador Dennis para aviones Pág. 675

Esta máquina, que es el resultado de un extenso estudio y perfeccionamiento realizado por Dennis Brothers, Ltd., ofrece una eficiente y segura manipulación de las cargas tanto para los aviones actuales como para la futura generación de los mismos. Está dispuesta una plataforma muy baja que eleva a una altura de 12 pies (3,65 m), y un transportador de rodillos y un puente facilitan el manipuleo de cargas hasta 5 toneladas de equipaje de viajeros, cargamentos y equipos de servicio.

Sistema transportador de cinta de 8,8 km de longitud Pàg. 680

El más grande sistema permanente de transportador de cinta del mundo ha sido puesto en funcionamiento hace poco a través de la campiña en Oklahoma del sur, en los Estados Unidos. La serie de siete transportadores que se extiende 8,8 km de una parte a otra traslada 1,016 T/hora.

Equipos británicos en ultramar Pág. 687

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AUTOMATIC HANDLING OF TIMBER

Machines sort for length, dimensions and quality

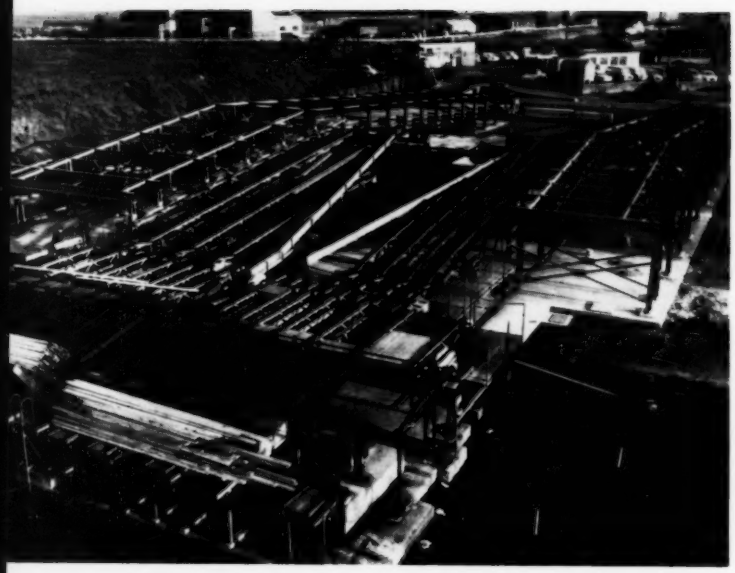


Fig. 1. General view from the feeding end of the LSA.1 17-station, length sorting machine as installed at Rainham.

A NEW automatic handling and sorting machine for timber which can do the work of 60 men is now in operation at the Phoenix Timber Co., Ltd., of Rainham, Essex. It is claimed to be in advance of any similar machine believed to exist anywhere else in the world.

The machine accepts timber from the ship, sorts it into batches of various lengths and delivers these batches steel-banded for loading on to lorries. The design allows for the handling of up to 28,000 pieces of timber a day under ideal conditions. It has been designed and manufactured by B. & A. Engineering Co., Ltd., after years of development and research in association with the Phoenix organization.

The Phoenix timber yards at Frog Island represent the biggest concentration of timber and allied materials anywhere in Britain with the exception of the Surrey Commercial Docks and one or two other public dock authorities handling timber for a number of importers, and have, therefore, offered the development engineers an exceptional opportunity of checking machine processes over a wide range of conditions.

Five years ago Phoenix decided that in order to get the maximum possible advantage from their deep water pier the methods of handling the timber in the yards after unloading from the ship should be reviewed. It was necessary to develop a machine and devise a method of handling which would reduce the physical work of the dockers. B. & A. Engineering Co., Ltd., were called in to develop such a machine employing the basic principles of automation but incorporating a number of completely new techniques.

Softwood arrives alongside the quay in mixed lengths and before despatch to sites all over the country has to be sorted into batches of equal length and size. The machine, which has been produced, will receive, dependent on size and average length of timber, up to 150 standards (equals 25,000 cu. ft.) of timber per day in mixed lengths and deliver at the other end packages of predetermined lengths steel banded for loading on to vehicles.

In addition, the machine can 'stick' the timber without in any way impeding its speed of operation. This is a process in which short thin lengths of wood are inserted crosswise between the lengths of timber in a batch to allow air to circulate around the individual pieces.

The Phoenix Timber Co., Ltd., have not yet had an opportunity of finalizing the arrangements for feeding on and taking off the timber and therefore at this stage they are using standard cranes for both operations. Because of this they are not getting the fullest advantage with regard to manpower as yet. However, it is reckoned that, including crane operators at both ends, a team of from 12 to 14 men is required to operate the machine, performing the job which under normal conditions, with usual mechanical aids, is now being done by a minimum of 60 men. It is hoped to improve on this performance.

The machine is 240 ft long × 130 ft wide and full use has been made in the design of the latest techniques in electric, hydraulic and pneumatic controls. Physical effort is almost completely eliminated. The steel strapping equipment is by Signode, Ltd.

The machine is virtually two separate machines, one side handling the longer boards and the other the shorter. Means are provided to automatically cross-transfer the two groups of lengths from one side to the other, depending on which tilt hoist is in use for feeding. It incorporates features, such as automatic discard of 25-ft to 32-ft boards, quality reject stations and duplicated feeding machinery necessitating complicated cross-transfer systems.

Boards between 6 ft and 24 ft in length are sorted into 17 different groups and there are two reject stations for 25-ft to 32-ft boards and one station for 5-ft long boards. In addition two quality reject stations are provided. The machine is limited to handling boards of 1½ to 3 in thick and between 4 and 9 in wide.

Operation is as follows: when timber is fed from tilt hoist A, the 25- to 32-ft boards are first rejected at a single station and then the 15- to 24-ft boards are thrown across to the B side of the machine. The shorter boards proceed up the A length sorting conveyor and are automatically sorted for length and transferred endwise into inclined gravity roll storage trays. These have a storage capacity equal to approximately 1½ sets on 1½ in thick material and

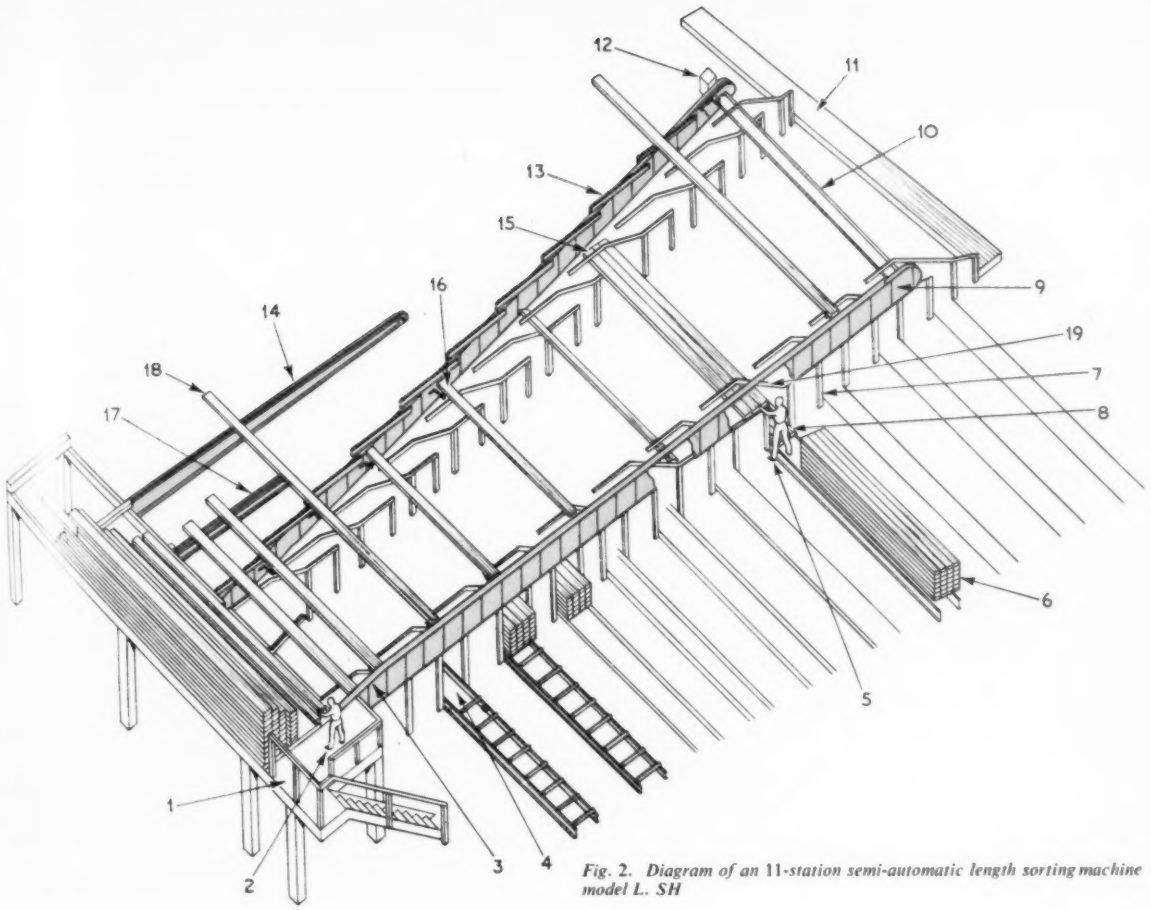


Fig. 2. Diagram of an 11-station semi-automatic length sorting machine model L. SH

KEY

1 Operating platform and table on which mixed length sets are deposited by crane or fork lift.
2 Operator turning down boards and feeding into dogs of conveyor
3 Automatic end flushing unit
4 6ft to 9ft long boards discharged at first station
5 Operator building up a set
6 One length set withdrawn on gravity rollers awaiting removal by end clamp fork lift truck or crane
7 Timber posts supporting skid rails and forming bins and access 'tunnels' alongside sets
8 'Set' building positions one for each length. Boards turned down by hand
9 R.H. steel beam in bolted sections. Carrying conveyor chain fitted with pusher dogs, driving shaft head, sprocket, tail sprocket and tension bearings
10 Cross beam connecting each side beam and carrying universally jointed driving shaft
11 19ft to 24ft long boards discharged over end of conveyor into one tray
12 Driving unit
13 L.H. beam in bolted sections carrying conveyor chain and pusher dogs, head shaft sprocket, tail sprocket and tension bearings. Roller tracks forming length selection stations
14 Auxiliary conveyor chains to support overhanging ends of longer boards
15 Selected boards collecting on tray skid rails against end stop
16 Board selected for length leaving the main conveyor on tray entry skid rails
17 Cross beam supporting ends of chain beams
18 Longer boards in transit over shorter board station
19 Skip rails and roller tracks with hand-operated stops forming 'trays' to gather selected length

three sets on 3-in thick material. A full tray is then selected and layers (i.e. four to seven boards) are released in regular order on to a gathering conveyor which conveys them to a fully automatic set building machine. The set buildings machine can produce 'solid' or 'gapped' sets and is equipped with stick magazines.

Boards which have been transferred from A to B side are then automatically sorted for length and stored in roller trays. A gathering conveyor and automatic set building machine is also provided on this side.

When the A tilt hoist is being reloaded with timber continuity of flow is ensured by feeding from the B tilt hoist from a set held in readiness. In this instance the 25- to 32-ft boards are first discarded and then the shorter boards (14-ft and down) are transferred across to the A side of the machine. The sorting process on A and B sides proceed independently as described above.

The machine is designed to handle the following:

Boards. 4 × 1½ in to 9 × 3 in and from 5- to 32-ft in length. The 5-ft boards are discarded into one pile; the 25- to 32-ft boards are discarded at two stations, one on either side of the machine; the 6- to 7-ft boards are selected into a common tray, as also are the 8-9 ft boards, leaving the 10- to 24-ft lengths to be sorted into individual trays. On future machines boards 8 to 9 ft long will be discharged into individual trays and the 5-ft, 6-ft and 7-ft discarded into one pile, thus simplifying the A sorting conveyor arrangements. One station on each side of the machine rejects hand-selected boards.

Sets. Maximum of 3 ft 6 in wide × 3 ft 6 in high × 32 ft long or 3 tons maximum weight, whichever is the lesser, but this size can be changed to suit particular requirements (i.e. capacity of lifting equipment may limit a set weight to, say, 2 tons and correspondingly smaller dimensions).

Manning, feeding end. Two operators at the tilt hoist interchange positions, one being stationed and controlling the tilt hoist and the feeding of individual boards on to the transfer conveyor, the other arranging the loading of a set

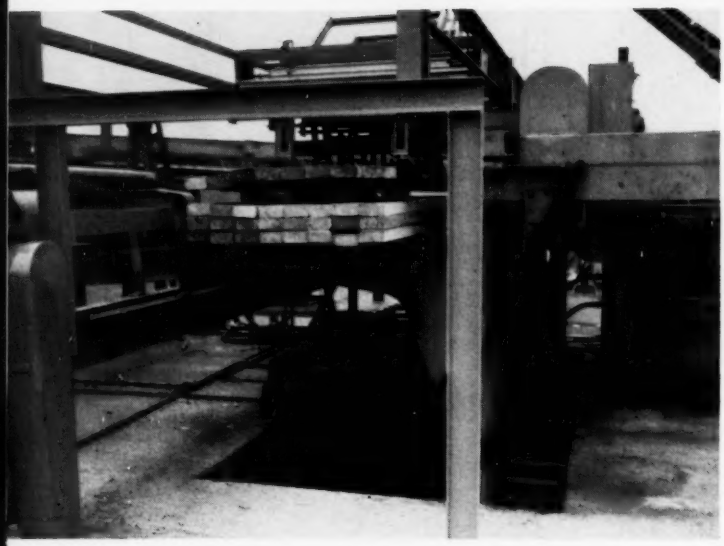


Fig. 3. The set making section of the LSA.1 machine

on to the tilt hoist which is being emptied. A third and fourth operator would supervise on the A and B side of the machine at the powered stops feeding individual boards to the length sorting conveyor and these men could also select boards for removal on the hand reject rolls.

Set making positions B side, 'long boards'. One operator supervises release of layers of boards from the trays and a second operator controls the set making machine. In addition, depending on length or quality of boards, two further operators at the opposite end of the machine are used.

'A' side. One operator supervises release from trays, and one for set making, the total being four for the feeding end and six for the set making end, plus a supervisor and crane or fork lift truck driver and slinger for handling timber to and from the machine.

Certain sizes or qualities of timber may require the assistance of one or two men to enable a high rate of throughput to be maintained.

The model L.S.1 described above can be supplied as a single-sided machine with the number of stations reduced to 11 (Fig. 2) and with the elimination of the cross-transfer mechanism and consequent simplification of the feeding end.

Operation of Set Building Machine

The tray triggers are designed to release a layer of boards at predetermined intervals on to the gathering conveyor which conveys the spaced layers to the layerer fingers extended over the set hoist. The timber is propelled on to the roller tracks built into the fingers and when correctly positioned initiates the layerer cycle causing the fingers to withdraw and strip the timbers against a stop so that they deposit on the top of a set being built on the set hoist platforms. The set hoist lowers the exact thickness of the layer under control of the level switch actuated by the timber before the fingers return to the extended position when arrival of the next layer initiates the cycle once again. An interlock is provided to stop the gathering conveyor in the event of timber arriving before the layerer fingers are in position to receive it. The stripping stops can be locked in position to produce a 'solid' set or a drive engaged to produce gapped and staggered layers on a set requiring drying.

A full tray is selected on an electrical switch and an automatic timer is provided to control the spacing of layers on the gathering conveyor at the commencement of set building. The layerer automatically takes over on the arrival of the first layer and from then on controls the release of layers from the trays. A batch counter which can be preset to the required number of layers in a set closes the tray exit when this number has been released.

The stick magazines can be hand or power operated to release sticks as required and the drive to individual boxes can be disconnected so that only the required number of sticks are dropped at each operation. The whole of the set building controls are contained in a cabinet and connected to the machine by flexible leads.

The power for the the layerer and set hoist is provided by an electrically driven hydraulic pump complete with solenoid operated control valves and limit switches on the motions.

The tray triggers are provided with adjustments to suit the thickness of board and the clamps which hold back all the boards in the tray while a layer is released have two positions to suit a solid or gapped set. The gapping mechanism provides 5 in of space in any one layer width and the staggering device is adjustable from $1\frac{1}{2}$ to 3 in stagger.

Powered roller tracks are provided to roll a completed set clear of the hoist ready to be taken away by crane or fork lift truck.

Automatic Quality Sorting and Measuring

It is usually the case with hardwoods that a parcel of timber contains pieces of many different widths and lengths. The sorting and measuring of these different sizes is an expensive and lengthy operation. Phoenix Timber Co., Ltd., therefore, also commissioned B. & A. Engineering Co., Ltd., to produce a conveyor assembly which would break up a rough bundle from a ship so that the pieces would pass individually over the conveyor and could be selected for size and quality in passage and made up into steel strapped batches with or without 'sticks'.

Soon after this machine was developed it became apparent that its output would be limited by the capacity of the measuring clerk who has traditionally to measure each piece of timber to a tolerance of $\pm \frac{1}{4}$ in on width and ± 3 in on length (the superficial measurement) and write it in chalk on each length. Another clerk records it in a book and works out the total of each batch.

The quality sorting machine was capable of handling well over 3,000 cu. ft. of timber per day whereas the usual performance of an efficient measuring clerk was between 800 and 1,000 cu. ft./day. Faced with this problem Phoenix commissioned New Electronic Products, Ltd., to produce a method of measuring the timber as custom demands but to speed up the process by using the latest electronic and computer techniques.

A machine has now been developed which measures the width and length of every individual piece of timber passing along the conveyor. The surface area is computed and carried in the electronic memory. Printing equipment attached to the machine records this information and presents the total surface measurement of a batch on demand.

The machine also includes a feature to measure softwoods where only the length measurement needs to be recorded. A counting mechanism accumulates the number of pieces of any one length together with the total of all the pieces in the batch, all figures being visible on a counter panel for manual or other reproduction. In due course this information will also be printable on demand.

LEEDS
MECHANICAL PARCELS SORTING OFFICE

By H. G. Vallings, A.M.I.Mech.E.

WHAT is believed to be the most highly mechanized parcels office in Europe was opened at West Street, Leeds, in December 1959. The handling and sorting system, Fig. 4, developed by Sovex, Ltd., in collaboration with the G.P.O., includes more than a mile of belt and chain conveyors and is capable, in its present form, of dealing with more than 10,000 parcels per hour. Provision has been made for additional machines which would expand the capacity to 14,000 per hour. Normally a parcel is ready for despatch in a sealed bag within 30 minutes of its arrival.

The installation is in operation for 24 hours a day, with a close-down period every week from 6 p.m. Saturday to 2 p.m. Sunday. Experience has shown that it deals very comfortably with the present traffic at Leeds and that it coped with the Christmas rush without strain.

Handling Incoming Parcels

Bags of incoming parcels are unloaded from vans at a loading dock where they are emptied through hatches on to an underfloor conveyor, Fig. 1. This conveyor has a 3-ft

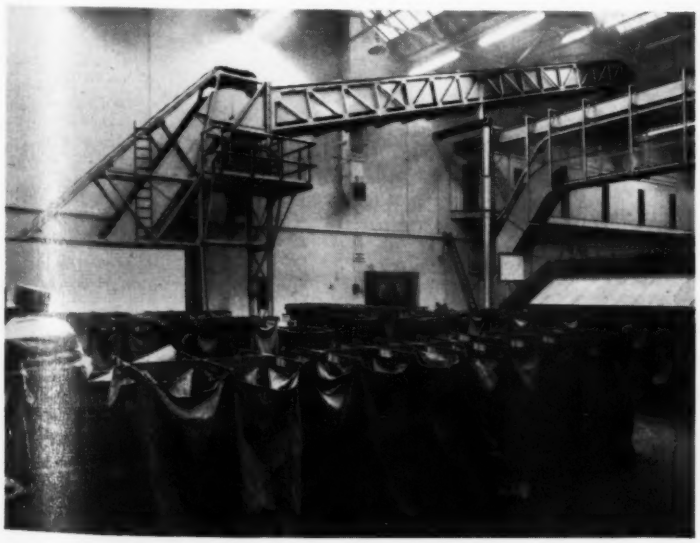
1

Fig. 1. Incoming bags of parcels emptied on to underfloor conveyor at loading dock. Outgoing bags carried to dock by overhead chain conveyor

Fig. 2. The twin-belt riser feeding a bridge-conveyor

Fig. 3. Parcels from underfloor conveyor entering twin-belt riser

2



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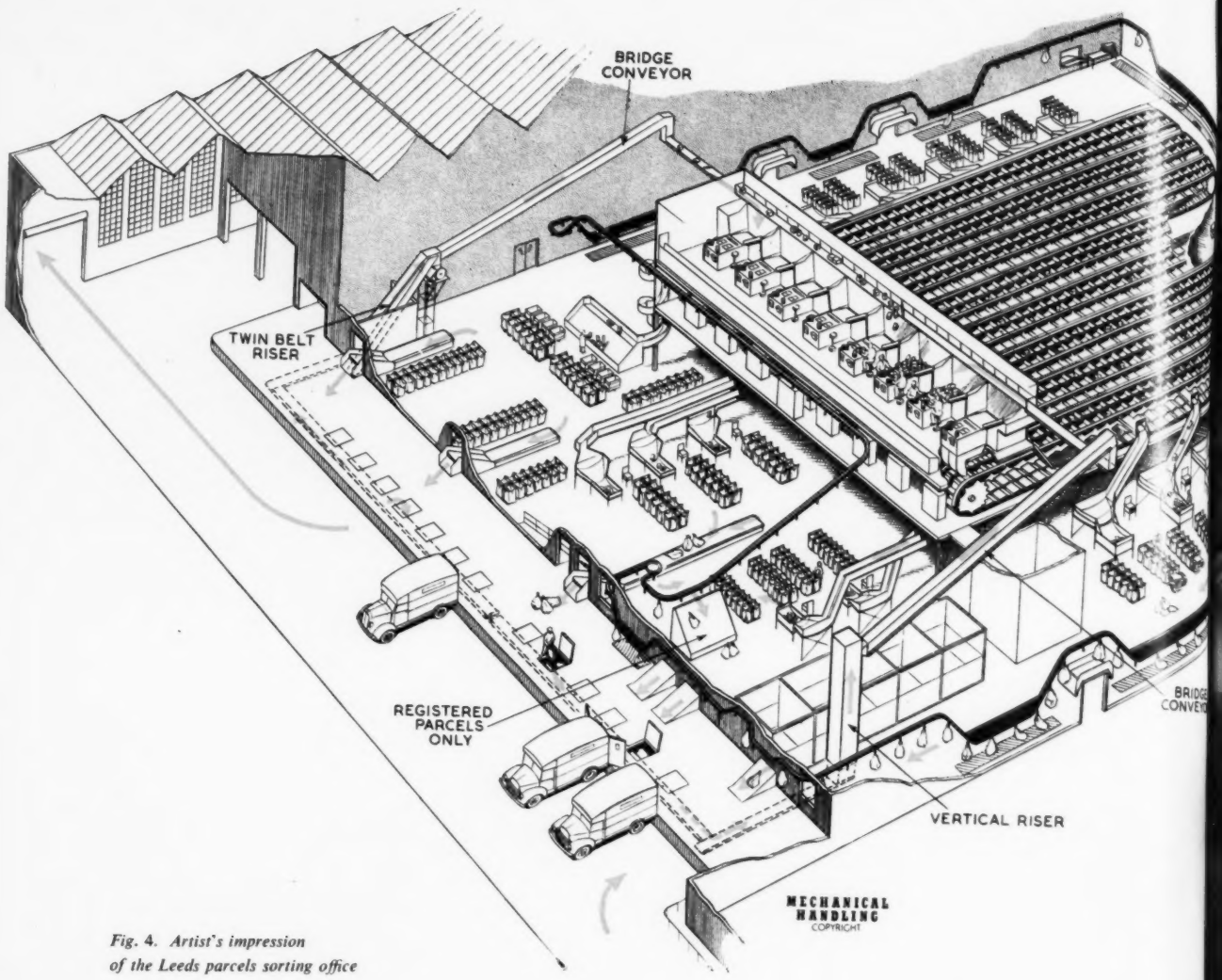

Fig. 4. Artist's impression of the Leeds parcels sorting office

wide rubber belt running at 100 ft/min, and is in two sections with a transfer roller, driven by a vee-belt from one end roller, bridging the small gap between them. Both sections of this conveyor can be driven in either direction so that parcels can be fed to either or both the twin-belt or the vertical riser. The purpose of these risers is to gain sufficient height so that parcels can then be carried to the primary sorting stations, at second floor level, on inclined plain-belt conveyors (bridge conveyors).

The twin-belt riser, Figs. 2 and 3, consists of a cotton carrier-belt rising at an angle of 55 deg and a cover-belt of similar material arranged so that, from the start of the slope, a parcel is carried between the two belts. The cover-belt has pockets sewn to the face, at one-foot intervals. So that it has sufficient weight to grip the parcels in their upward passage, some or all of these pockets may be fitted with steel bars. The cover-belt is driven by a separate drive-band and the carrier-belt by a toe-band in addition to a normal driving drum. The same principle—carrying parcels between two belts—is employed in the vertical riser, Fig. 5, but in this case the carrier-belt is of the rubber grip-face type and the gripping force is provided by an air bag, maintained at approximately 10 lb/ft^2, acting on the outside of the cover-belt. The parcels are carried vertically on to a bridge-conveyor.

After leaving the bridge conveyors the parcels are carried on a horizontal belt conveyor to the primary sorting stations. This conveyor is in two sections, each of which can be reversed so that parcels can be carried from either bridge conveyor or from both simultaneously.

Sorting

Ploughs operated by hydraulic rams divert the parcels from the horizontal conveyor into hoppers at the six primary sorting stations, Figs. 6 and 7. (Two of the eight shown in Fig. 1 are reserve stations for future expansion.) Each plough is provided with quickly detachable hinge fittings at either end so that it can be set to suit the direction of feed. The parcels slide down the sloping sides of a hopper on to a belt which feeds them on to a table towards the two sorters who man a station. A bar-switch on the table top cuts out the drive to the feed belt if there is an accumulation of parcels near the sorters.

The sorter places a parcel on a trap door and presses one of 24 selector keys according to the destination, Fig. 8. This is the primary sorting operation, and the keys are marked so as to divide the British Isles on a broad basis and also to provide sorting for several postal districts in the City of Leeds. Two keys are unmarked and are used as reserves as will be explained later. When a key is pressed

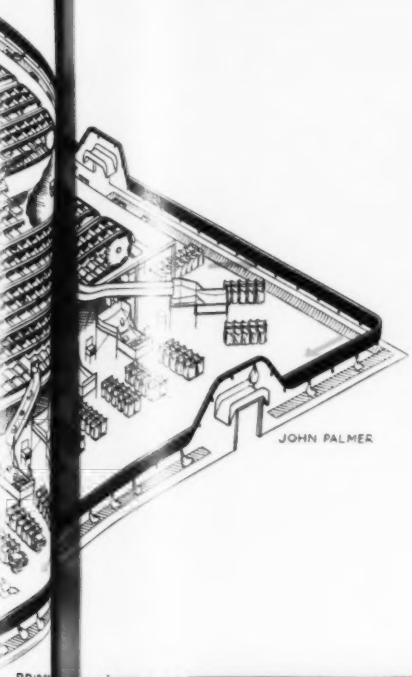

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Fig. 5. The vertical riser feeding a bridge-conveyor

Fig. 6. One plough set to divert parcels into a hopper

Fig. 7. Primary sorting stations. Odd-shaped parcels are placed on conveyor on the right

Fig. 8. Parcel falls through trap door when selector key is pressed

Fig. 9. Parcel discharged from chute into bucket conveyor

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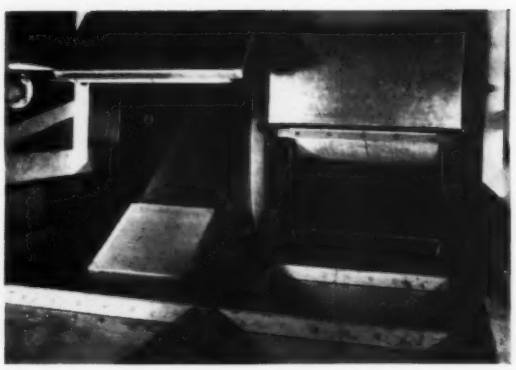

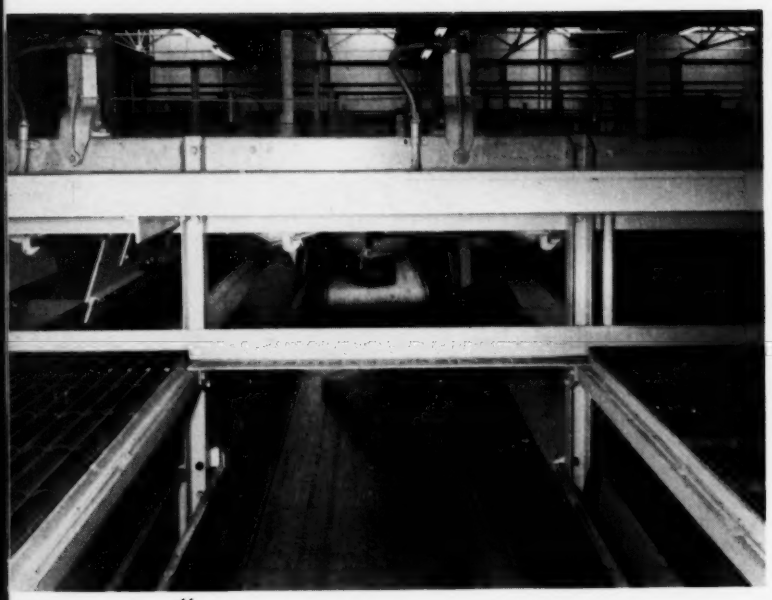

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Fig. 10. *Parcel discharged from bucket conveyor on to collecting conveyors*

Fig. 11. *Collecting conveyors beneath bucket conveyors*

Fig. 12. *Bottom plates of buckets are closed as they pass over sprockets*

12

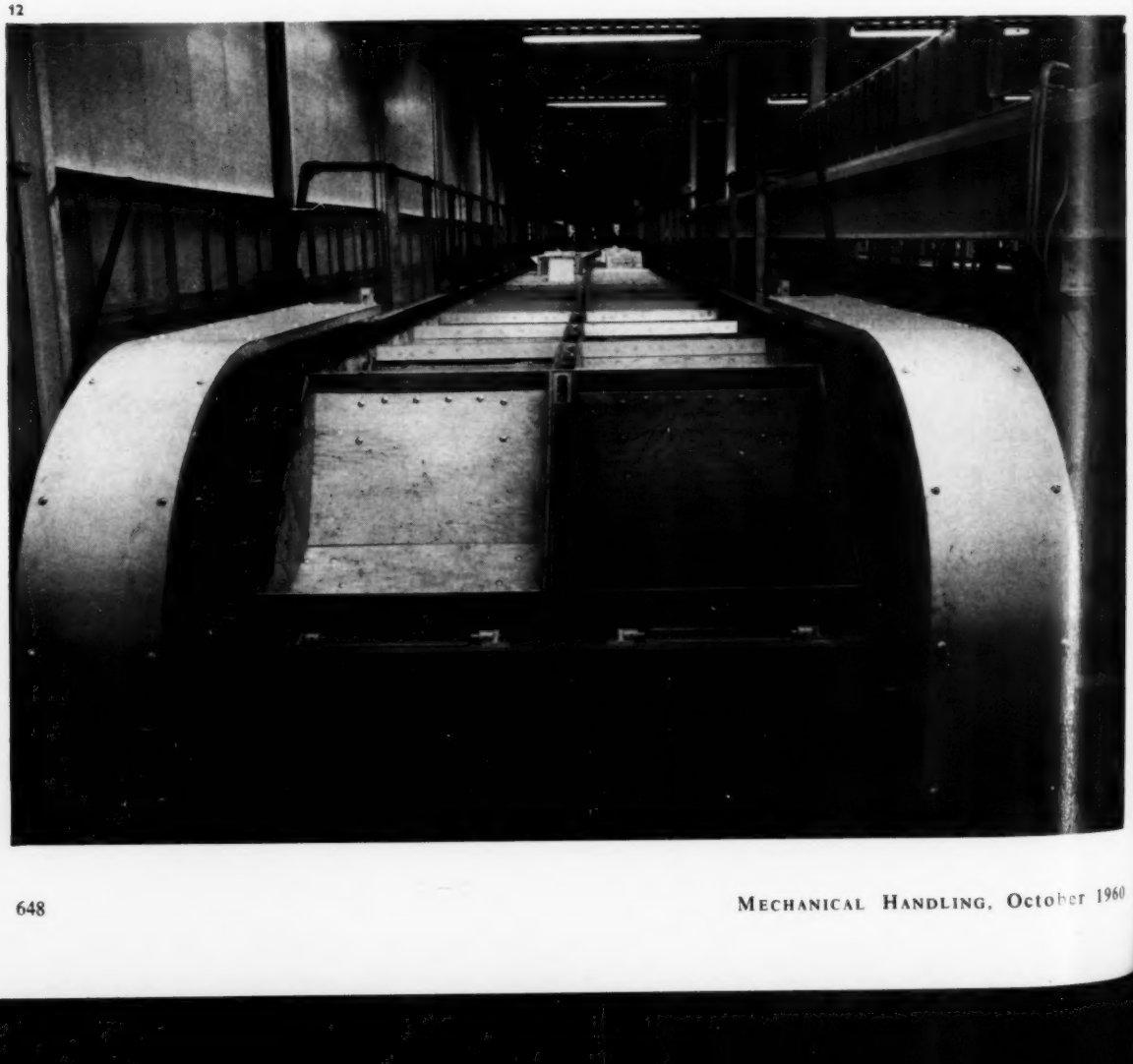

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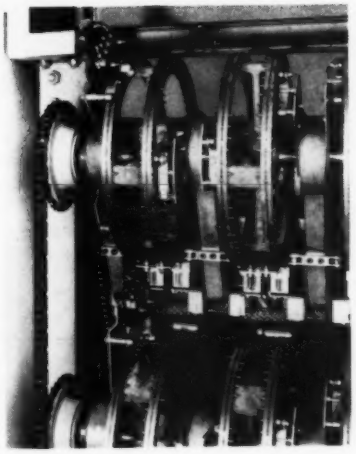
Fig. 13. *Secondary sorting*

Fig. 14. *The electro-mechanical memory*

Fig. 15. *Pin-wheel control gear*



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the trap door opens, the parcel falls into a chute with a discharge door at its lower end and the trap door closes. The opening of the chute door is synchronized with the movement of a bucket conveyor, immediately below, and can only open so as to discharge a parcel into a bucket, Fig. 9. Each of the six sorting machines in use has a double train of buckets, one for each sorter, and runs at the rate of 30 buckets per minute.

Each bucket has two hinged bottom plates held in the closed position by a spring-loaded catch. A parcel is carried forward in a bucket until this catch is tripped by a solenoid-operated striker thus opening the bottom plates and allowing the parcel to drop on to one of 24 belt conveyors running at right angles, Figs. 10 and 11. Discharge on to these cross-belts is dependent upon the key selected by the sorter but is controlled by an electro-mechanical memory described below. The bottom plates are closed automatically as the buckets pass over the chain tensioning sprockets, Fig. 12.

The collecting conveyors carry the parcels via chutes to concentrators on the ground floor where secondary sorting into bags is carried out by hand, as shown in front cover picture. Each concentrator is fitted with a photo-electric cell which will, if it becomes overfilled, cut out the drive to the appropriate collecting conveyor and render the corresponding selector key inoperative, in order to protect the sorting machines from jamming and consequent damage. When a collecting conveyor is stopped an illuminated number at the primary sorting station is extinguished to indicate that the selector is out of use. In this case the primary sorter can either put the parcels concerned aside until the accumulation subsides or he can make use of one of the reserve selections.

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Certain odd-shaped or exceptionally long parcels cannot be handled in the system described: these are placed on a conveyor, shown on the right of Fig. 7, and are carried to a wheeled container on the ground floor where they are sorted by hand. In the event of a parcel not being discharged from a bucket on to a cross-belt it will travel to the end of the conveyor where it will be tipped on to overflow conveyors feeding into a wheeled container for hand sorting.

The Electro-mechanical Memory

The mechanism required for serving a two-operator primary sorting station is shown in Fig. 14. It consists of 54 pin-wheels (corresponding to the number of selector keys used by two sorters plus six spares) with a positive drive from the bucket conveyor so that each wheel makes $\frac{1}{60}$ of a revolution while the conveyor moves one bucket pitch. Each wheel has 60 pins in its rim, Fig. 15, and these pins are a sliding fit in the rim with their axes parallel to the wheel axis.

When a selector key is pressed, a roller is moved by an electro-magnet so as to push one of the pins sideways causing one end to protrude beyond its normal position. This particular pin, now representing a parcel in a particular bucket, is armed, i.e. able, after further movement of the wheel, to operate a switch controlling one of the solenoids which release the bottom plates of a conveyor bucket. These switches are placed at various positions in relation to the arming roller, the circumferential distance representing the horizontal movement of a bucket from its loading position to one of the 24 cross-belts. After operating a switch, the pin is returned to its normal position by a stationary cam.

Fig. 16. Outgoing bags carried by overhead chain conveyor

Despatch

After the secondary sorting on the ground floor, the bags are sealed and inserted in clamps suspended from a continuously moving overhead conveyor which makes a circuit of the building, Fig. 16. These clamps have four different types of trip lever, distinguishable by both a colour and a letter code, so that bags can be released automatically by cams of different shape according to their destination. Outgoing bags are released so that they slide down any one of three ramps at the loading dock, Fig. 2. The fourth type of clamp is used for carrying empty bags to the cleaning room.

Bags for local delivery are not handled by the overhead conveyor but are carried to other points on the loading dock by three belt conveyors. Separate arrangements are made for dealing with registered parcels, but the overhead conveyor is used to carry the incoming bags from the loading dock to the department concerned.

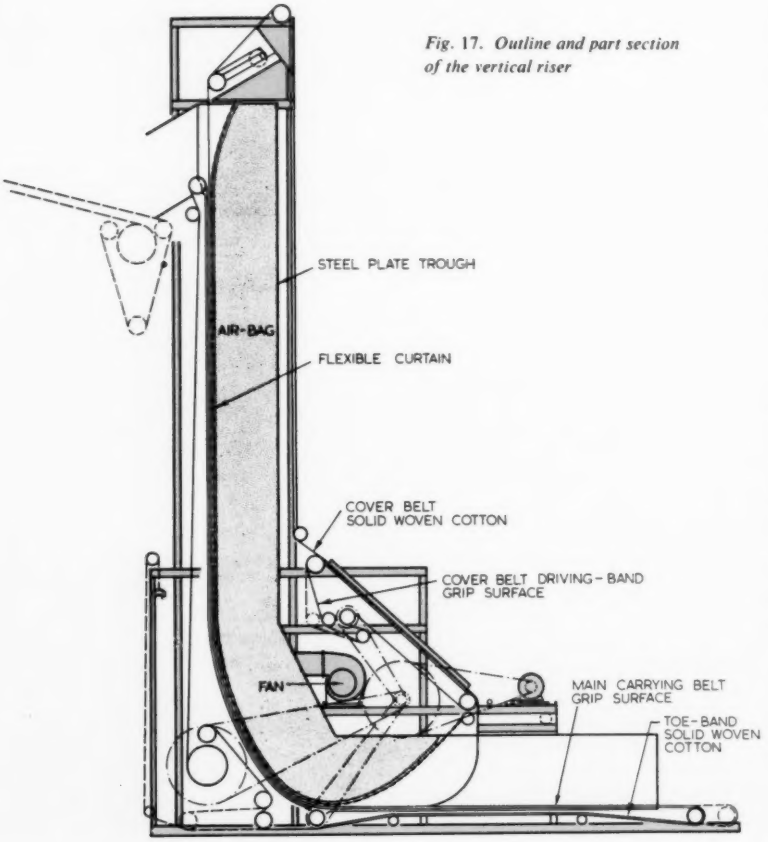


Fig. 17. Outline and part section of the vertical riser

Equipment

Among the many firms supplying equipment for this installation were: Conveyors and sorting machines—Sovex, Ltd.; Electric equipment—Watford Electric Co., Ltd.; Wiring installation—Southern and Redfern, Ltd.; Cotton belting—British Belting & Asbestos, Ltd.; Rubber belting—British Tyre & Rubber Co., Ltd.; Self-lubricated bearings—Pollard Bearings, Ltd.

Figs. 2, 3, 4, 5, 7, 8, 10, 12 and 14 in this article, and the front-cover picture, are Crown copyright by courtesy of H.M. Postmaster-General. Figs. 6, 9, 11, 16 and 17 are by Sovex, Ltd., and Fig. 15 by Watford Electric and Manufacturing Co., Ltd.

Karl Schmoll

200-TON FLOATING CRANE

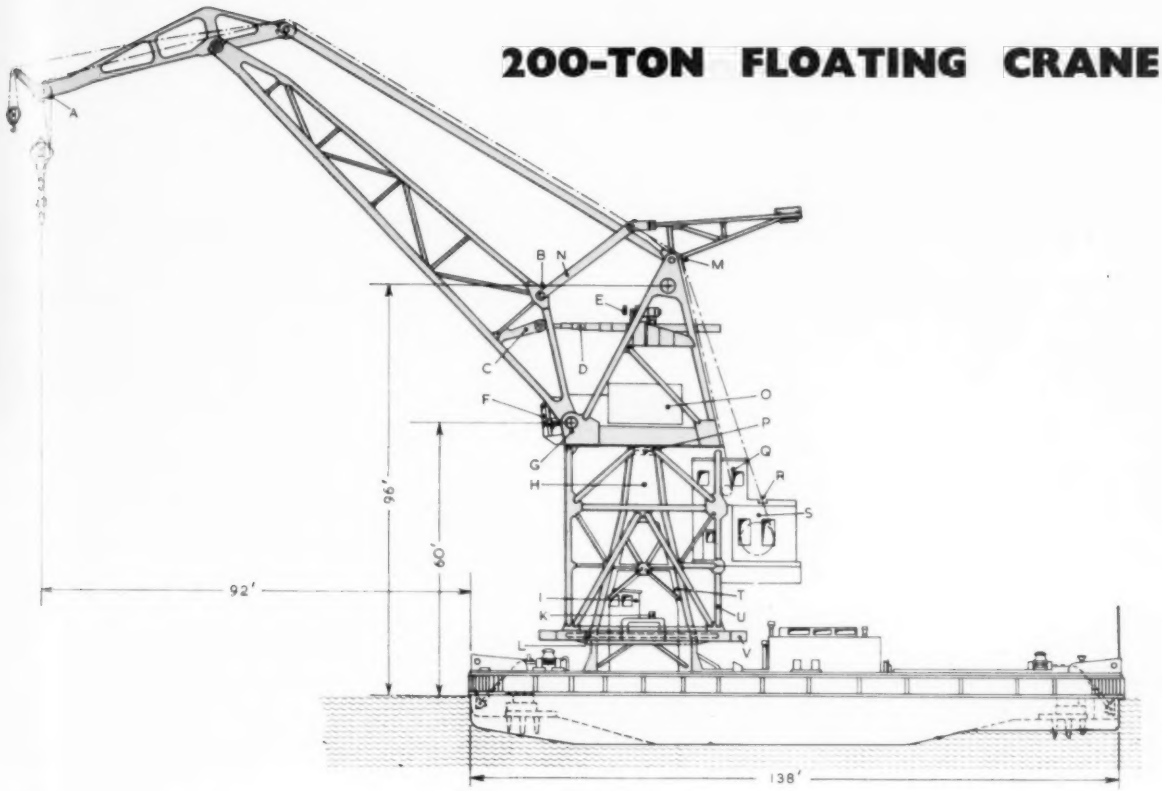


Fig. 2. Layout drawing of floating crane.

A Jib head pulley of flying jib
B Pivot point of connection rod in upper flange of base guide
C Attachment of luffing screw
D Luffing screw
E Luffing mechanism
F Crane operator's cab
G Pivot point of base guide
H Slip-ring body for feeding current to the rotary framework of the crane
I Wheel house
K Crane slewing mechanism
L Stationary thrust disc
M Pivot point of tension guide in the superstructure
N Connection rod leading from upper flange of base guide to balancer
O Contactor house
P Main thrust bearing at head of supporting pyramid
Q Machinery house for the 10-ton auxiliary hoist
R Point where hoisting ropes pass through roof of machinery house
S Machinery house for the two 100-ton hoists
T Supporting pyramid
U Rotary framework
V Thrust ring of rotary framework

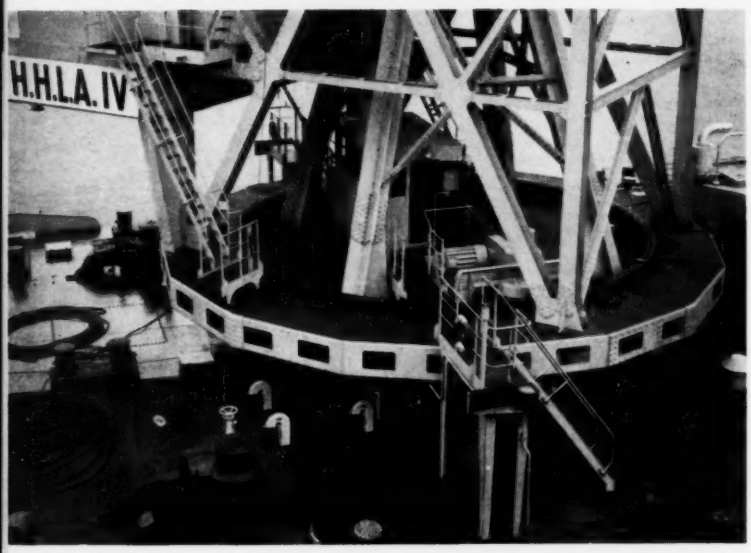
Fig. 1. 200-ton floating crane at Hamburg harbour

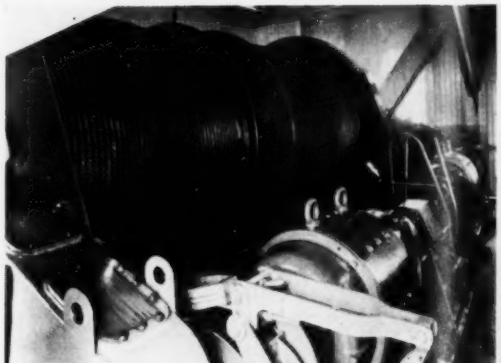
For all kinds of erection work, for transshipping the heaviest cargoes, repositioning harbour cranes, etc., a new floating crane of 200 metric tons carrying capacity has been put into operation at Hamburg; this crane was built jointly by Demag A.G., Duisburg (crane delivery), and Blohm & Voss, Hamburg (pontoon delivery). Previously, only a 100-ton floating crane had been available at Hamburg but could not meet the greater demands made with regard to handling rates and maximum loads.

The new floating crane is a double-guide level-luffing slewing crane; its jib system comprises a base guide, a tension guide and a flying jib, and is balanced by the counterweight housed in a moving balancer. This jib system

Fig. 3. (*Left*) *The spacious crane operator's cab is mounted on the rotary framework between the pivot points of the base guide. It affords a good view of all handling operations*

Fig. 4. (*Below*) *At the bottom left, the machinery house for the two 100-ton main hoists can be seen; above it, on the right, there is the machinery house for the 10-ton auxiliary hoist; at the same level, the casing of the slip-ring assembly located on the crane's central axis*





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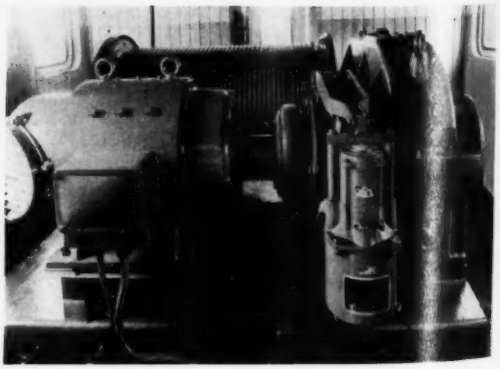

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Fig. 5. (*Above*) *Shows the supporting pyramid, which is mounted firmly on the pontoon, and the rotary framework pivoted on and revolving around the pyramid. At a height of approx 6 ft above the deck, the rotary framework ends in a thrust ring with an inner diameter of 33 and an outer diameter of 43 ft*

Fig. 6. Two 100-ton hoists are located in the main-hoist machinery house. Each of the two drums can take 750 ft of rope and has a diameter of 7 ft

Fig. 7. 10-ton hoist; in the foreground the 34-kW D.C. motor with coupling, brake and standard gear unit; all parts are mounted on a welded base frame

ensures a horizontal path of the load and a constant suspension length during luffing.

At the maximum radius of 92 ft from fender edge, the crane's carrying capacity is 50 tons. During handling operations at the front of the pontoon, i.e. in the direction of the pontoon's longitudinal axis, the maximum load of 200 tons can be handled at a maximum radius of 26 ft; for work on the sides, the radius is 20 ft. Its height of lift is 92 ft above and 60 ft below the water level.

The main hoisting mechanism comprises two separate 100-ton hoists; for loads above 100 tons, the two hooks are connected by a lifting beam with a 200-ton main hook. The auxiliary hoist has a carrying capacity of 10 tons.

The screw-type luffing mechanism is pivoted in the superstructure. It is driven via a three-reduction gear unit by turning the nut of the screw.

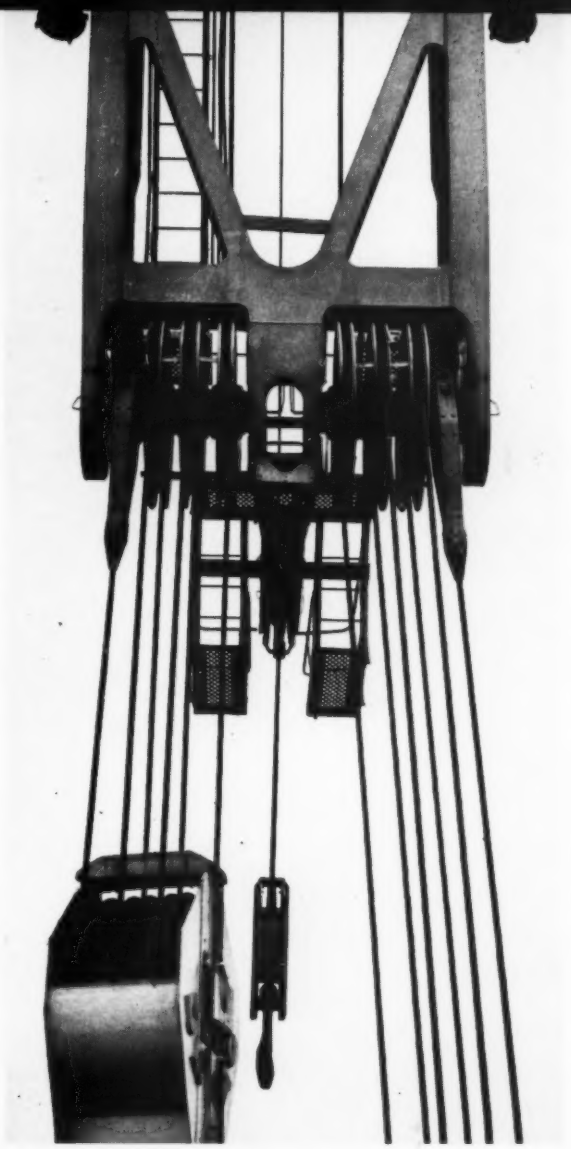


Fig. 8. (Right) View from the bottom flange of the base guide on to the head pulleys in the flying jib; electric gauges are built into the suspension gear of the main hoisting ropes, as overload safety devices

Fig. 9. (Below right) The screw-type luffing mechanism is pivoted in the superstructure. On the left in the picture, the luffing mechanism can be seen with driving motor, brake, spur gear unit, nut and screw; on the right —the attachment of the screw in the base guide of the jib. The screw itself is protected from atmospheric influences by a telescopic tube

Fig. 10. (Below) Convenient stairs and landings make possible safe access to the crane, up to the rope pulleys in the flying jib

Speeds

Main hoisting			Auxiliary hoisting		Luffing	Crane slewing	Crane travelling
0-37 tons	37-75 tons	75-200 tons	0-5 tons	5-10 tons			
21 ft/min	21 or 13 ft/min	13 ft/min	82 ft/min	52 ft/min	Duration of complete extraction or retention: 5 min	0·2 r.p.m.	6 knots

The two crane slewing mechanisms are mounted on the stationary thrust disc in the supporting pyramid; the pinions engage the pin gear in the rotating thrust ring.

The pontoon has a size of 138 × 72 ft and is 16 ft deep. The machinery equipment, housed in its centre, comprises two equivalent 515 h.p. diesel engines, each of which is on one side coupled with a 160 kW 440 V D.C. Ward-Leonard generator (for the main and auxiliary hoists) and, via shaftings, with a Voith-Schneider screw. On the other side there is another 69 kW 440 V D.C. Ward-Leonard generator (for slewing and luffing) as well as an 80 kVA 380/220 V 3-phase A.C. ship's mains generator and a 12·5 kW exciter. The diesel set is used either for driving the pontoon or for generating power for the crane operating mechanisms.

When the main engines are shut down, or when the crane is in the harbour, an air-cooled 21 kW 3-phase A.C. generator feeds the pontoon's light and power station.

The two Voith-Schneider screws that are employed have outputs of 450 and 490 PS, are attached at both ends of the pontoon and offset from the centre line.

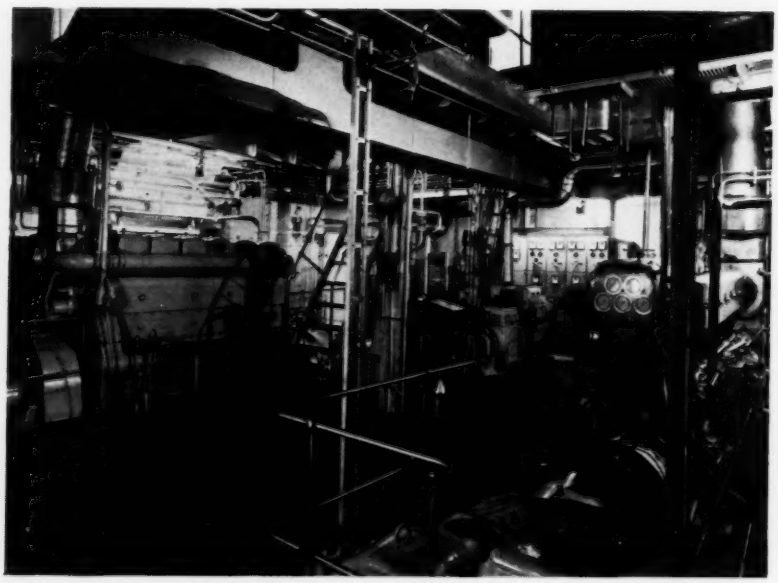


Fig. 11. (*Above left*) *The rope pulleys in the flying jib of the double-guide level-luffing jib, of welded plate construction, can easily be reached by stairs and ladders*

Fig. 12. (*Above right*) *Hinged joint between the top flange of the base guide (cross-beams pointing upward and downward in the right-hand direction) and the connecting rod pointing upwards to the left; this rod connects the base guide with the balancer*

Fig. 13. (*Left*) *Machinery room below deck with the 515 h.p. diesel sets. The air-cooled diesel engine located between the main engines supplies the 21-kW pontoon's mains when the main engines have been closed down*

BUNKER TRAIN IN TUNNELLING AND MINING

A CONSIDERABLE reduction of costs in tunnelling operations, gallery construction as well as in transport of coal, ore and rock in underground mines has been achieved with the newly developed bunker train BZ35 (system—Dr. Heidemann), built by Salzgitter Maschinen A.G. (West Germany). The bunker train enables a continuous loading and hauling away—in one operation—of a load up to 60 tons, and the loss of working time arising from the shunting of mine cars, when conventional methods are applied, is eliminated. The BZ35 bunker train which is a track-mounted unit consists of a driving carriage, a number of bunker wagons without front walls, the number of wagons depends on the conditions of the working site and on the specific gravity of the material, and a loading carriage. The bunker wagons are linked together by articulated joints. The guiding of the base frame of the various train elements is carried out by a double strand scraper chain. The driving drum is in the driving carriage while the reversing drum is installed in the loading carriage. Driving power is provided by a special-type pneumatic or electric motor through spur gear and chain-reduction drive. The unit incorporates automatically controlled hydraulically operated chain pre-tensioning. A loading conveyor and a pneumatically operated pushing device, both in the loading carriage, provide for equal loading and filling of the train.

The bunker train can be hauled by a mining locomotive, and travels through bends of 66 ft radius. The loading and unloading in bends is at present not yet possible, but it is hoped that this shortcoming will be overcome shortly too.

The method of continuous loading of material at a rate of up to 107 cu. ft./min ensures the full utilization of any loading machine. The unloading at dumping site or into bunkers is also carried out in a steady flow. It is claimed that the safe working of the bunker train is not affected by the type of materials to be transported, and that coal, salt, ore and rock, crushed or in coarse lumps of up to 2 ft × 3 ft in length of edges, wet or dry, can be conveyed by the bunker train.

The range of applications for the bunker train is growing steadily, and it is claimed that in some cases it can achieve a 40-50 per cent saving of time in loading as against operation carried out by mining cars. Recently a bunker train BZ35 was successfully used for gallery construction in the vicinity of Crevola d'Ossola (Italy), South of the Simplon Tunnel, and a fully electrically operated bunker train has been delivered for Soviet coal mines.

Fig. 1. The bunker train at work in a gallery

Fig. 2. Unloading the train at a dumping site

SINKS BY CONVEYOR

Fast Production at Leisure Kitchen Equipment Ltd.

By D. M. Potter, B.A. (Oxon.)

At Long Eaton, between Nottingham and Derby, stand two factories of Leisure Kitchen Equipment Ltd., one devoted to the preliminary pressings of the sheet steel into the shape of sinks and kitchen cabinets and the other providing enamelling (and other finishing processes) for them. The former is the newer shop, in fact only a year or two old and consequently arranged with all the equipment in the right place for current requirements. The older factory now engaged on the finishing operations has naturally experienced more changes and did at one time house the presses, the re-arrangements necessitated by their removal naturally leaving the remaining plant in a less logical order. Nevertheless, both these factories have a spectacularly high output which has to be in step since one supplies the other, and both have an outstanding array of conveyors.

The purpose of these conveyors is nine-fold:

1. To carry the work through continuous processes.
2. To keep work constantly moving.
3. To provide inter-operation transport.
4. To keep work off the floor.
5. To provide inter-operation storage.
6. To enable work to travel to successive operations in the right logical order although the plant may not be in the best position on the floor.
7. To reduce man-handling.
8. To provide delicacy in handling.
9. To provide drying time.

To appreciate how these benefits are achieved it is first necessary to trace the routes followed by these conveyors in the general plant layout, illustrated by our artist in Fig. 3.

Press Shop Layout and Processes (Meadow Lane Factory)

The Press Shop is a most attractive steel-framed building partly ornamented externally by a curtain wall of multi-coloured enamelled steel sheets, and equipped with every kind of advantage to improve working conditions by good lighting, heating, ventilation, mechanical handling and so on. It measures 350 × 100 ft in plan and is 35 ft to the crane tracks. It is constructed on two level, mainly unobstructed, floors, the operating part of the heavy plant appearing on the upper although the supporting structure naturally is carried through to the ground floor, the principal

Fig. 1 (*below right*). *The Morris overhead electric crane lifting sheet from the ground floor to the first floor for pressing*

Fig. 2 (*below left*). *A Yale & Towne 'Worksaver' is used with a pallet which in effect is a loading bench at working height for supplying the guillotines on the ground floor at the Meadow Lane factory*

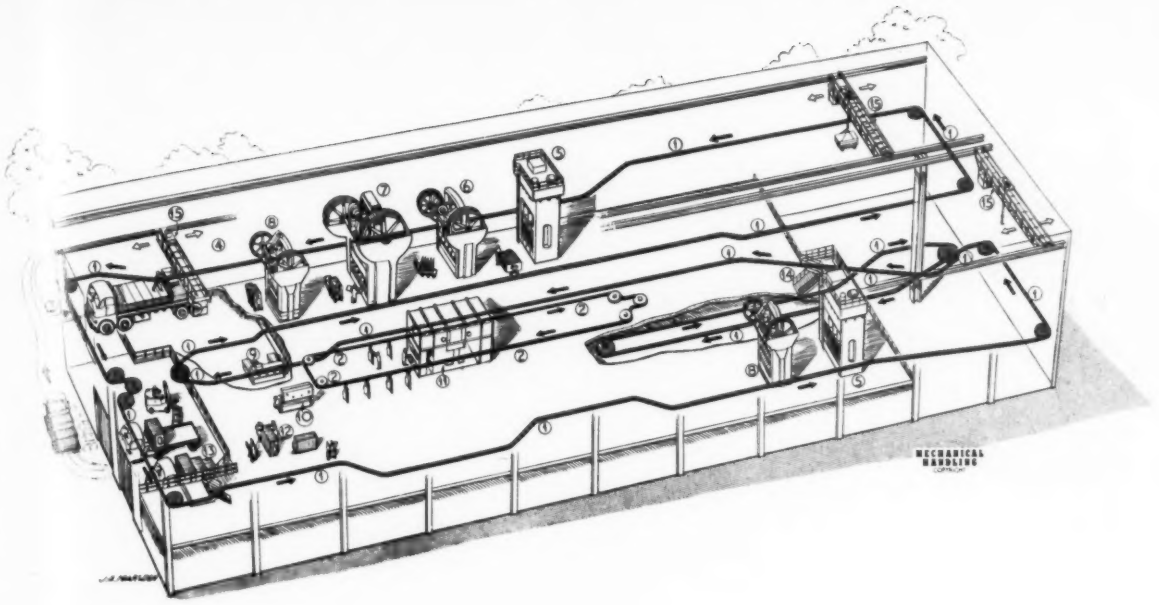


Fig. 3. Artist's impression of the Meadow Lane works

KEY
1. Conveyor No. 1
2. Conveyor No. 2
3. Steel sheet delivered from mill
4. Stores
5. Draw Press
6. Trim press
7. First and second form press
8. Final trim and pierce
9. Pierce
10. Form press-brake
11. Degreaser
12. Welding and fettling bay
13. Stacking in stillages
14. Conveyor No. 1 rising from ground to 1st floor
15. Overhead crane

duty of which is to house the raw material and light machines, especially those for the preliminary operations.

The latter may be recognized as running in the following streams: (*a*) Mild steel sink production; (*b*) stainless steel sink production; (*c*) cabinet and accessory production.

Mild Steel Route (sinks) Meadow Lane Factory

Mild steel of vitreous enamelling quality (as well as stainless steel and zinc-coated steel for cabinets) is received on road vehicles which are driven straight into the metal store for unloading by low-level overhead electric Herbert Morris cranes of 5 tons capacity which place the sheets into stock. Requisitioned material is lifted by the overhead crane on to mobile tables mounted on floor-level tracks which run transversely across the floor to one of the four guillotines respectively made by Rhodes, Keyton, or Cincinatti, and capable of dealing with sizes up to 8 ft × 10G.

The sheared pieces and pieces delivered to size for main sink pressings are at present taken by Yale & Towne and Ransomes, Sims & Jefferies fork lift trucks to the large hatch-type opening in the first floor which enables the high-level over-head Morris electric travelling crane to pick them up from the ground floor and place them alongside the presses on the first floor, Fig. 1.

In order to visualize the use of the conveyors more easily it would assist if the activities on the press shop floor were classified into three categories: 1, operation on material; 2, lift on/off conveyor; 3, transport by conveyor.

Seen in this way the sequence at the Meadow Lane Factory on most models becomes as illustrated in Fig. 3.

(i) Draw in British Clearing Press 700-ton double action hydraulic press or in the 1,100-ton model of the same make.

A1. Lift on Conveyor No. 1

A2. Transport by Conveyor No. 1

A3. Lift off Conveyor No. 1

(ii) Trim outside in 250-ton single action Bliss press.

As A

(iii) First and second form in the 1,500-ton single-action Cowlishaw-Walker press.

As A.

(iv) Final trim, pierce waste and tap holes in the Cowlishaw-Walker 350-ton press.

As A

(v) Pierce overflow in 75-ton Cowlishaw-Walker press.

As A

(vi) Form return edge on moulding on Rafter press-brake.

B1. Lift on Conveyor No. 2

B2. Transport by Conveyor No. 2

B3. Lift off Conveyor No. 2

(vii) Degrease in automatic trichlorethylene plant.

C1. Lift on Conveyor No. 2

C2. Transport by Conveyor No. 2

C3. Lift off Conveyor No. 2

(viii) Weld and fettle.

D1. Lift on Conveyor No. 1

D2. Transport by Conveyor No. 1

D3. Lift off Conveyor No. 1

(ix) Stack in stillages and remove to Nottingham Road.

To assist in inter-operational transfer and return of finished pressings to the ground floor a new very long conveyor system is in course of proving, known as the main overhead rail storage conveyor. It is an overhead Renold chain conveyor and by means of suspended claws on to which the pressings are hung acts as a conventional pendulum conveyor. It can be seen as No. 1 conveyor on drawing Fig. 3 and also in Figs. 4, 5 and 6, which give some impression of its application by the way it runs the whole length of the shop passing alongside the presses in such a

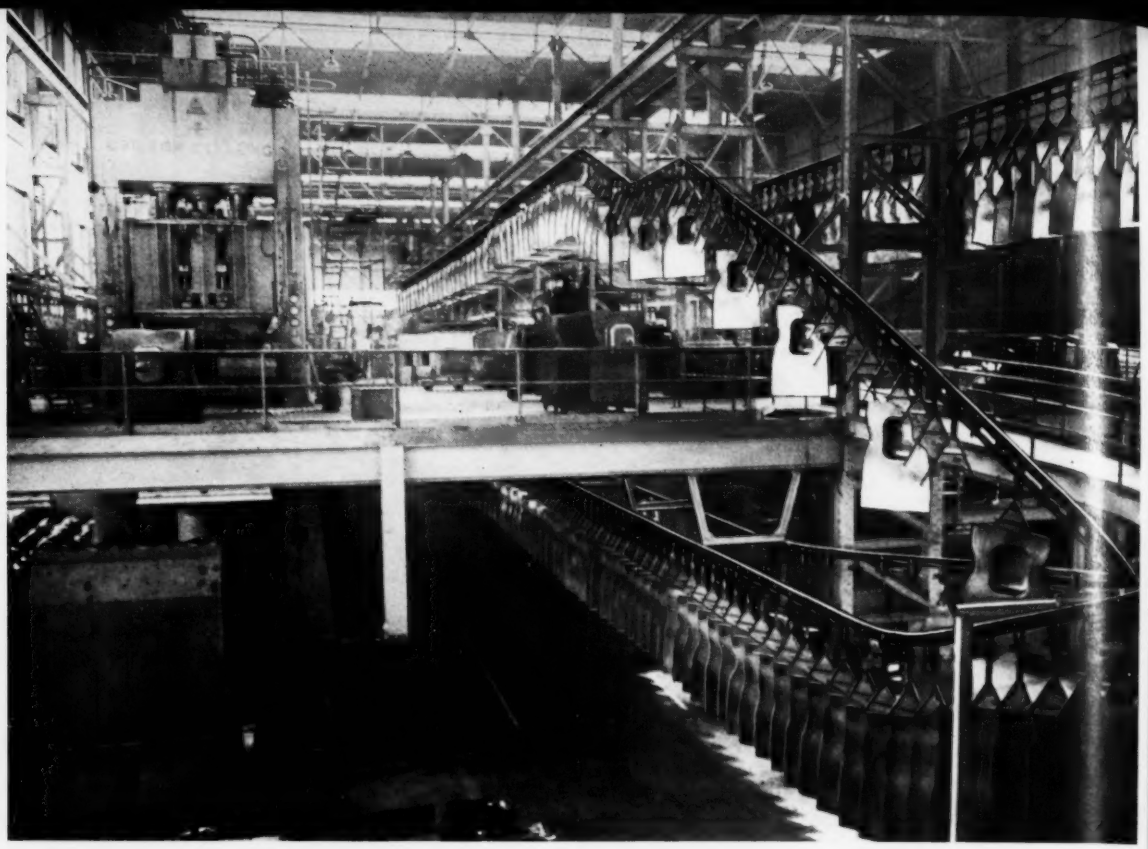
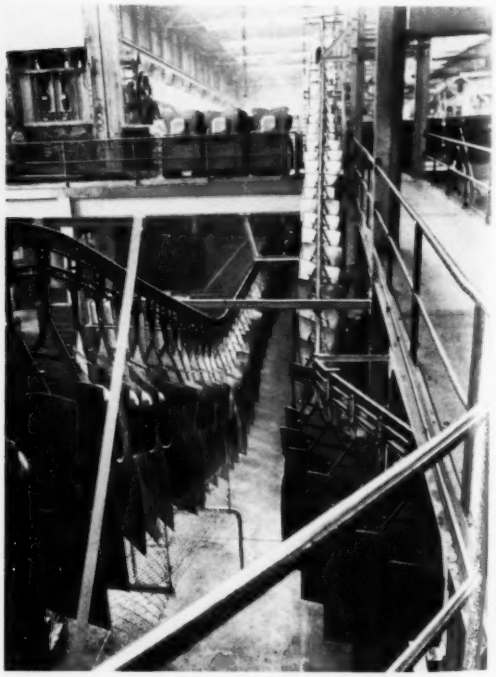


Fig. 4. (Above) Conveyor No. 1 in the Meadow Lane factory showing the half of the first floor shop to the left of the stanchions. The conveyor travels round the presses, to the ground floor and up in the roof, so that it is used for inter-operational transport and storage

Fig. 5. (Left) As Fig. 4 but showing the side of the Meadow Lane press shop to the right of the central stanchions with the conveyor fully loaded

Fig. 6. (Below) A further view of No. 1 conveyor indicating the way it traverses the two floors, in particular turning curves in both vertical and horizontal planes



way that work may be lifted on and off for the appropriate operation.

A second conveyor which has been in use for some time is that which runs round the automatic degreaser; it can be seen in Fig. 3 as conveyor No. 2 and also in Fig. 7. After the last pressing operation work is put on this conveyor which is again of overhead Renold chain fitted with pendulum hooks. At the degreaser each piece in turn is taken off, degreased and returned to the conveyor until it reaches the welding station, where it is removed for welding.

Fig. 7. Conveyor No. 2 which passes round the degreaser at the Meadow Lane works

Fig. 8. Pressings in stillages being transported by fork truck to the trailers on which they are taken from the Meadow Lane to the Nottingham Road factory

Fig. 9. (Right) The main drive of No. 1 conveyor at Meadow Lane, indicating how the two sprockets in opposite spans of the same conveyor are driven by the one motor

After delivery by No. 1 conveyor to the ground floor, the finished pressings are assembled in stillages and stacked by fork truck on Scammel trailers for subsequent removal to the Nottingham Road works where the finishing processes are carried out, Fig. 8.

Conveyor Construction

The conveyor referred to above as No. 1, the main overhead rail storage conveyor, uses no less than 1,830 ft of Renold chain type 105/362 having 9-in pitch hollow bearing pins in a biplanar link enabling it to turn in both horizontal and vertical planes. To these links (see Fig. 6) the Leisure engineers have fitted trolleys, each consisting of two suspended claws, for carrying the sinks. An interesting feature is that the drive is imparted to the chain at two points which, although one is half way along the chain relative to the other, are only separated by a few feet, an arrangement made possible because the chain route doubles back on itself causing the half-way position to approach the main drive. A practical result is that one main power unit, a 10-h.p. motor, is able to drive (through a reduction gear, pinion driver, driven wheel and two simple 3-in pitch roller chains) two 16T sprockets; then both engage with the same conveyor chain, but one at the outermost and one at the innermost position, as seen in Figs. 3 and 9. Because it is driven at two points which must be synchronized since they are from the same mains drive, the chain running is naturally more efficient. The speed variation is $3\frac{1}{2}$ to $9\frac{1}{2}$ ft/min.

Round the degreaser plant is conveyor No. 2, the chain centres of which are 75 ft. The links are Renold pattern 105/240/11, a 6-in pitch hollow-bearing type driven by a motor at 8 ft/min. Here again suspended claws carry the work.

Stainless Steel Sink Production—Meadow Lane Factory

The sequence of operations is quite different for stainless steel sinks but it is not proposed to examine this route in detail since the same crane, fork truck and conveyor systems are used as those which move the mild steel sinks.

Cabinet Components—Meadow Lane Factory

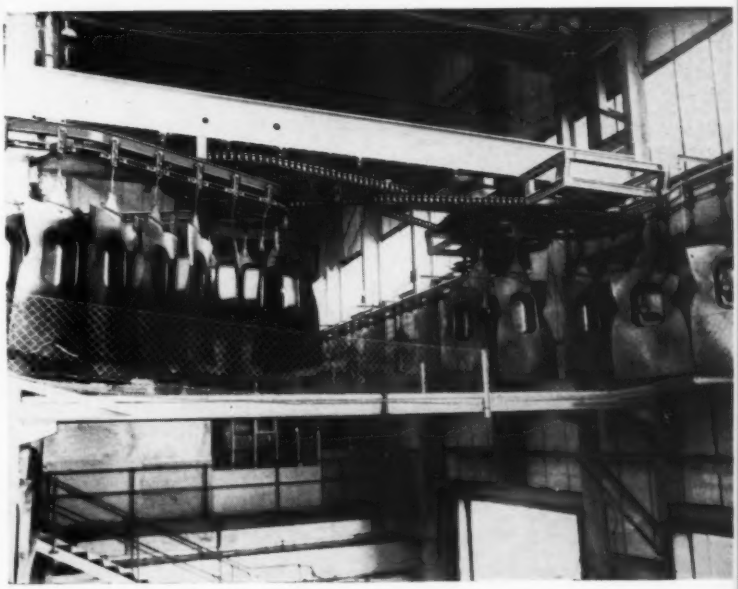
These are produced at this pressing and forming stage by lighter equipment on the ground floor, after which they are shipped in the same way to the Nottingham Road works for assembly and finishing.

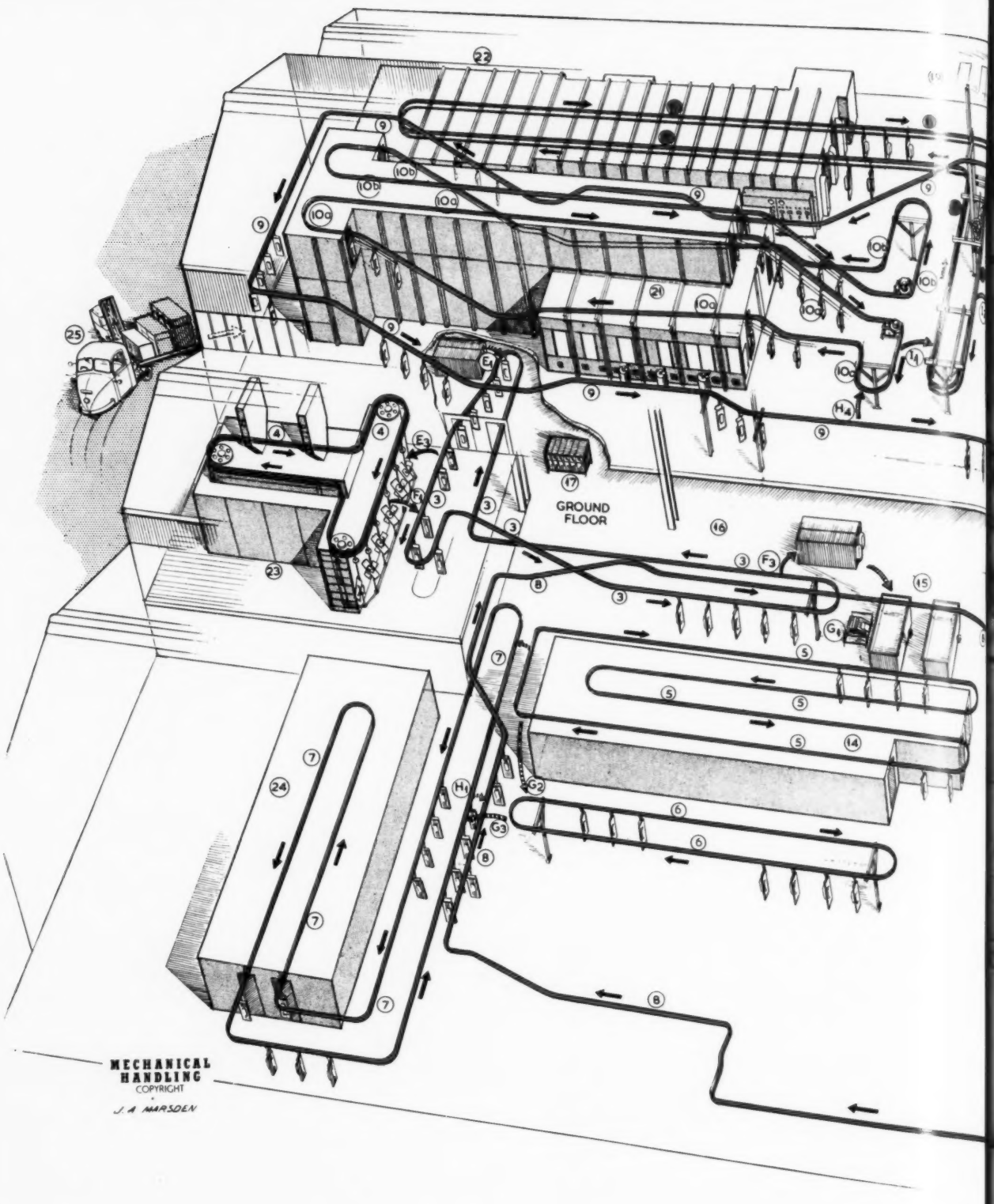
NOTTINGHAM ROAD FACTORY

Enamelling and Finishing

As in the case of the Meadow Lane works, the Leisure factory at Nottingham Road, Long Eaton, deals with three main production streams: (*a*) Mild steel sinks, vitreous enamelled; (*b*) Stainless steel sinks; (*c*) Cabinet and accessory production.

Although they provide very important and attractive finished products it is not proposed to examine the stainless




GROUND
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HANDLING
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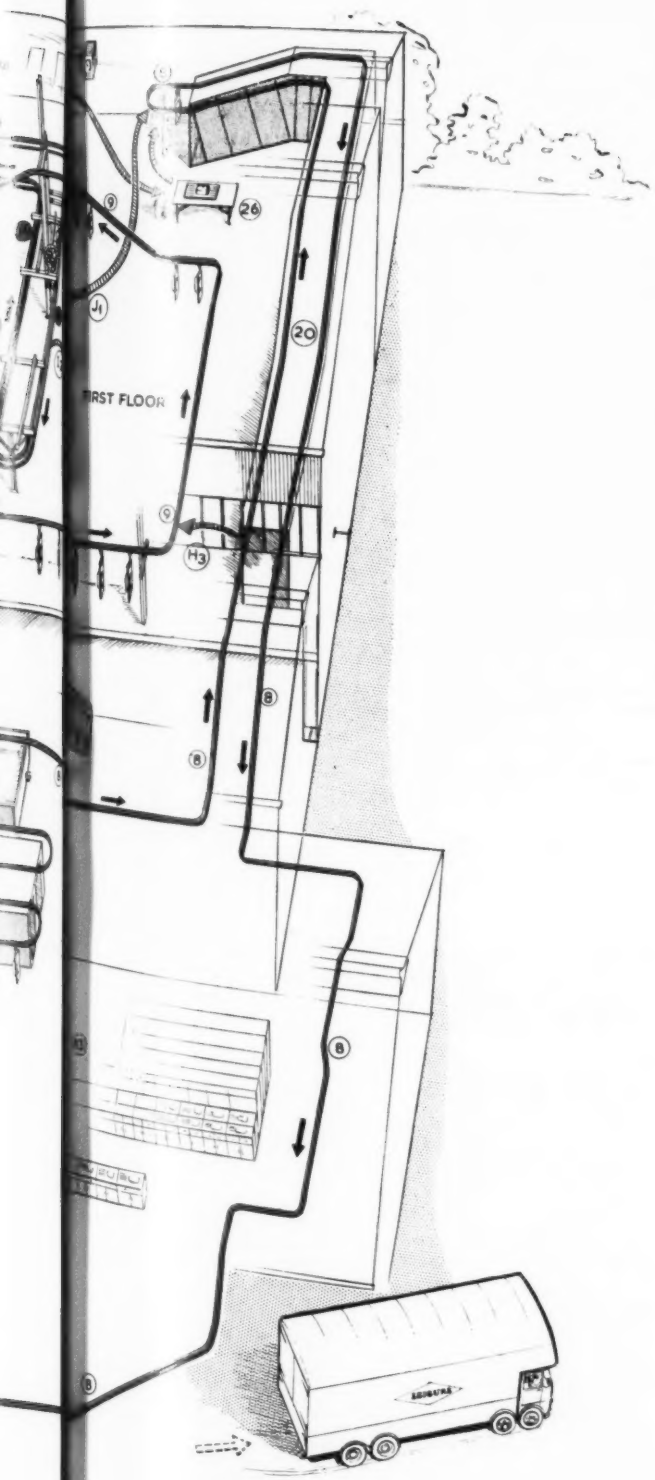


Fig. 10. Artist's impression of the Nottingham Road works:

KEY

1-3. Shop conveyor
4. Shot blast conveyor
5. Drying oven conveyor
6. Storage conveyor
7. Furnace conveyor
8. Warehouse conveyor
9. Service conveyor.
10a. Spray conveyor
10b. Spray conveyor
11. Electric furnace conveyor
12. Inspection benches
13. Warehouse
14. Grip coat dryer
15. Grip coat dipping
16. Ground floor
17. Stillages
18. First floor
19. Polishing bay stainless steel
20. Drying oven
21. Spray booth
22. Ferro electric continuous furnace
23. Shot blasting plant
24. Ferro gas oven
25. From press shop, Meadow Lane
26. Sound deadening

steel sink and the cabinet production lines separately since they do not provide information on the handling system additional to what is revealed by the finishing processes on the mild steel sinks which mainly consist of a complicated enamelling sequence.

Mild Steel Sinks, Enamelling at Nottingham Road Factory

When the mild steel sink pressings arrive at the Nottingham Road works they are unloaded on the ground floor where there is headroom of 12 ft 6 in; which partially explains why the principal operations take place on the first floor where two bays have a clearance of 15 ft to the eaves and the third 30 ft, giving plenty of overhead space for the conveyors, elevated drying ovens and so forth.

A bird's-eye view of the Nottingham Road works has been prepared by our artist and may be seen in Fig. 10. From this it is clear that the processes and conveyors are brought into use in the following order:

E1. Lift on Conveyor No. 3.
E2. Transport on shop Conveyor No. 3 from ground floor to first floor.
E3. Lift off Shop Conveyor No. 3 on to Shotblast Conveyor No. 4.
(x) Shotblast in Tilghman automatic plant on Conveyor No. 4.
F1. Lift off Shotblast Conveyor No. 4 on to Shop Conveyor No. 3.
F2. Transport on Conveyor No. 3 from first floor to ground floor.
F3. Lift off Conveyor No. 3, Fig. 12.
(xi) Dip in grip-coating tank.
G1. Lift on to Conveyor No. 5, Fig. 12.
(xii) Pass through drying oven on Conveyor No. 5.
G2. Lift off Conveyor No. 5 on to Conveyor No. 6 (a storage conveyor).
G3. Lift off Conveyor No. 6 on to Conveyor No. 7.
(xiii) Pass through grip coat fusing furnace at 860 deg C on Conveyor No. 7.
H1. Lift off Furnace Conveyor No. 7 on to Warehouse (or Shop) Conveyor No. 8, Fig. 13.
H2. Transport on Conveyor No. 8 from ground floor to first floor new enamelling shop.
H3. Lift off Conveyor No. 8 on to Conveyor No. 9, the service conveyor.
H4. Lift off Conveyor No. 9 on to duplicate Conveyors Nos. 10a and 10b, the spray conveyors.
(xiv) Pass through spray booths on Conveyor No. 10a or 10b, Figs. 14 and 15.
(xv) Still on Conveyor No. 10a or 10b, pass through overhead dryer at 290-320 deg F, Figs. 14 and 15.
I1. Lift off Conveyor No. 10a or 10b on to Conveyor No. 11, the electric furnace conveyor, Fig. 16.
(xvi) Sink enamel fused at 840 deg F on Conveyor No. 11, Fig. 16.
I2. Lift off Conveyor No. 11 on to Inspection Bench.
(xvii) Inspect.

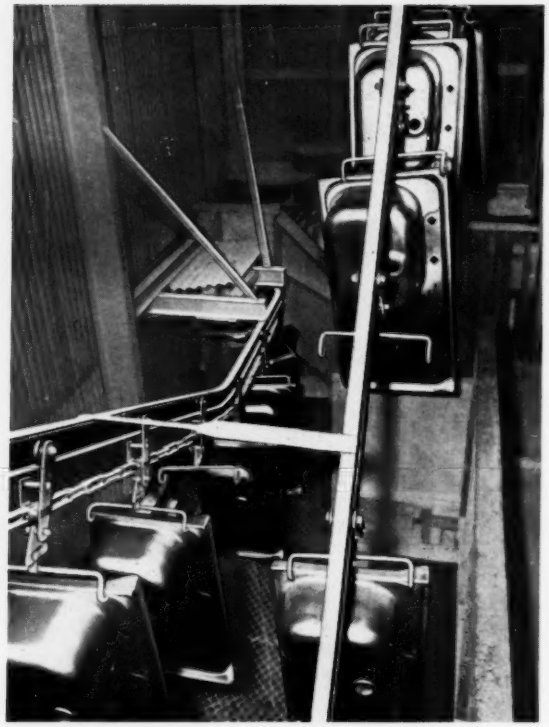
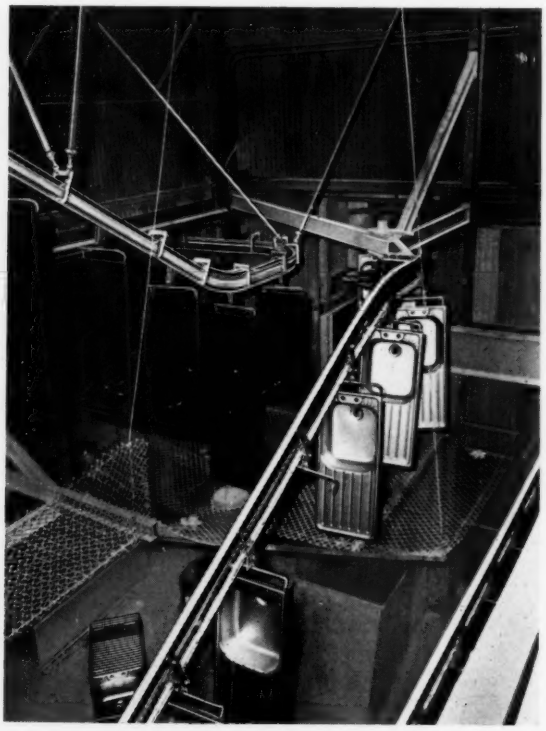


Fig. 11. *Conveyor No.* 3 *at Nottingham Road works taking shot-blast pressings from the shot blast to the ground floor*

Fig. 12. *At the Nottingham Road works when the shot-blast pressings enter the ground floor shop from the right, they are hand dipped in the grip coat below and loaded on Conveyor No.* 5. *After drying and fusing the grip-coated pressings return over this area, as seen, on their way to the enamelling*



J1. Lift on to Warehouse Conveyor No. 8.
(xviii) Pass through drying oven on Conveyor No. 8.
J2. Transport still on Conveyor No. 8 down from first floor to ground floor warehouse.
J3. Lift off Conveyor No. 8.
(xix) Fit accessories.
(xx) Load into containers and despatch.

Safety nets are in position under all these overhead conveyors. Complex forced ventilation ensures that the spray booths are not injurious to the operators.

It is apparent that there is a considerable amount of manual lifting on and off conveyors. However, since the average weight of each individual piece of ware is only 22 lb, it will be appreciated that this is not heavy labour.

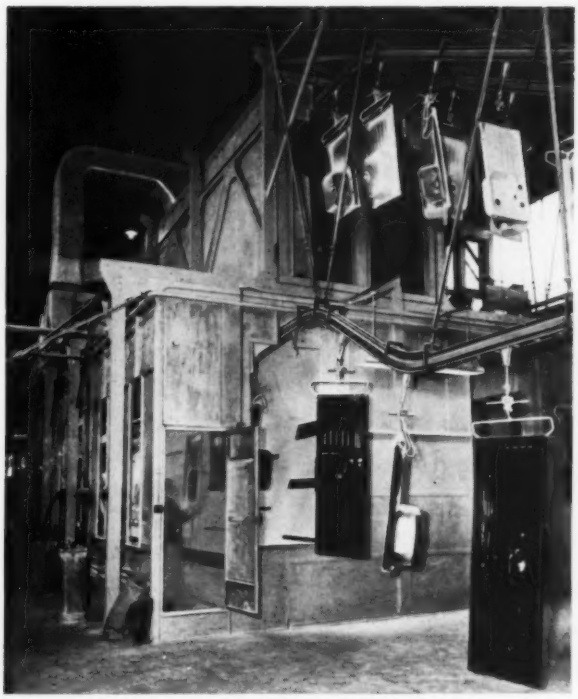
The conveyors in this system have been supplied by the following manufacturers:

Shop	Conveyor No.	3: Fisher & Ludlow
Shotblast	Conveyor No.	4: Tilghman
Dryer	Conveyor No.	5: Fisher & Ludlow
Storage	Conveyor No.	6: Fisher & Ludlow
Furnace	Conveyor No.	7: Crescent-Webb
Warehouse/Shop	Conveyor No.	8: Fisher & Ludlow
Service	Conveyor No.	9: Fisher & Ludlow
Spray	Conveyor No.	10a and 10b: Fisher & Ludlow
Furnace.....	Conveyor No.	11: Crescent-Webb

The principal contractors for the enamelling plant and allied conveyors were Ferro Enamels Ltd., of Wolverhampton, the remaining work being carried out by the engineers of the Leisure organization. In Figs. 14 and 15 as well as drawing Fig. 10 it is possible to see the spray booths and overhead drying ovens: the Fisher & Ludlow conveyors Nos. 10a and 10b may be observed travelling through the spray booth and then rising to the overhead ovens. While not connected with material movement, it is interesting to note in Fig. 15 the large trunking which deals with the air input.

Purpose of the Conveyors

In general terms the conveyor system at Nottingham Road works enables the mild steel sinks to be enamelled in a continuous process; passing through shot blasting, grip coating, finish enamelling in 2-cover coats, and the drying and firing operations. One of the curious features to a casual observer is the use of the Service Conveyor No. 9. If work requires a second coat after a circuit on Conveyor No. 10 through the sprayers and dryers, then it is replaced on Service Conveyor No. 9 from which it is lifted in due course on to the Spray Conveyor No. 10 again. The result is that on Service Conveyor No. 9 there may be at the same time many sinks in different stages of enamelling; all of which is, of course, completely baffling to a newcomer until it becomes clear that the outward appearance of each piece indicates the nature of the next operation required and the man responsible is able to recognize and take off the line the item the operators require. It is quite conceivable that a piece of work may make several circuits on Conveyor No. 9 before it is needed for spraying and in addition the order of mounting on this line bears no relation to the order of subsequent operations, i.e. whether it is first or second coat and so forth. This is, however, not a matter for criticism (as it might be for instance in some machining operations) since the operator can clearly understand by a quick glance at each piece as it approaches what is the next operation. Attention is drawn to this point to illustrate that except when on conveyors designated process conveyors the work is not taken off in the order it is put on and in fact may not be taken off at all for a number of circuits; but this is no detriment to the quality or to the speed of output, and is



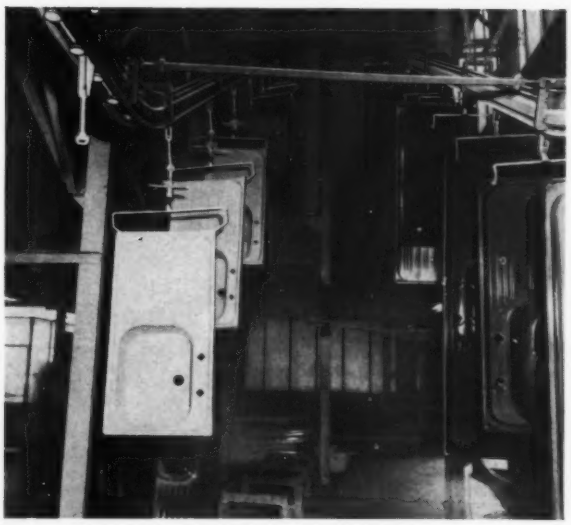


Fig. 13 (Above) After the grip coat is fused on Conveyor No. 7 on the ground floor at Nottingham Road works, the coated pressing is lifted on to Warehouse Conveyor No. 8 which takes it to enamelling on the first floor

Fig. 14. (Above right) The enamel spray booths, through which pass Conveyors 10 (a) and (b). These same conveyors carry the work through overhead drying ovens, which they are leaving in this picture

Fig. 15. (Right) Sinks leaving the spray booths and being elevated by the conveyor to the overhead drying ovens

Fig. 16. (Below) Sinks leaving the electric enamel fusing furnace. They are being lifted off the conveyor for inspection

in fact an advantage as it permits a longer drying period. This feature is more prominent in periods of steel shortages which results in small batches of work. When steel supplies are good, the sinks pass round the production circuit in lots of 1,000.

It is, therefore, beneficial to look at this conveyor system and see what is the objective at each part of the installation and how each conveyor meets the service demanded. In the opening paragraph it was said that these conveyors had a nine-fold purpose: four of them are obviously common to all cases, viz., keeping work moving, keeping work off the floor, reducing man-handling, provision of delicacy in handling to avoid damage. The other five, however, have special significance at particular points: these five objectives

Fig. 17. The sinks are finally transported by fleets of lorries designed to carry specially constructed container bodies. These are lifted from the road chassis by overhead electric hoist and mounted on rail trolleys for packing

being the use of the conveyors for processing, for inter-operational transport, for storage, for correcting the operational sequence when the operations are out of sequence on the floor, and to provide additional drying time.

Conveyors used for Processing (Both Works)

The conveyors which actually carry the work while it is processed are quite distinct. They are:

Conveyor No. 4 through the shot-blast.

Conveyor No. 7 through the ground floor oven which fires the grip coat.

Conveyors No. 10a or 10b, on which the work receives the enamelling frit spray and subsequent drying in the overhead ovens.

Conveyor No. 11 where the sprayed sinks are fired.

In all these cases the work is moving while undergoing the process, so that it can be said these are orthodox process conveyors.

Conveyors used for Interoperational Transport (Both Works)

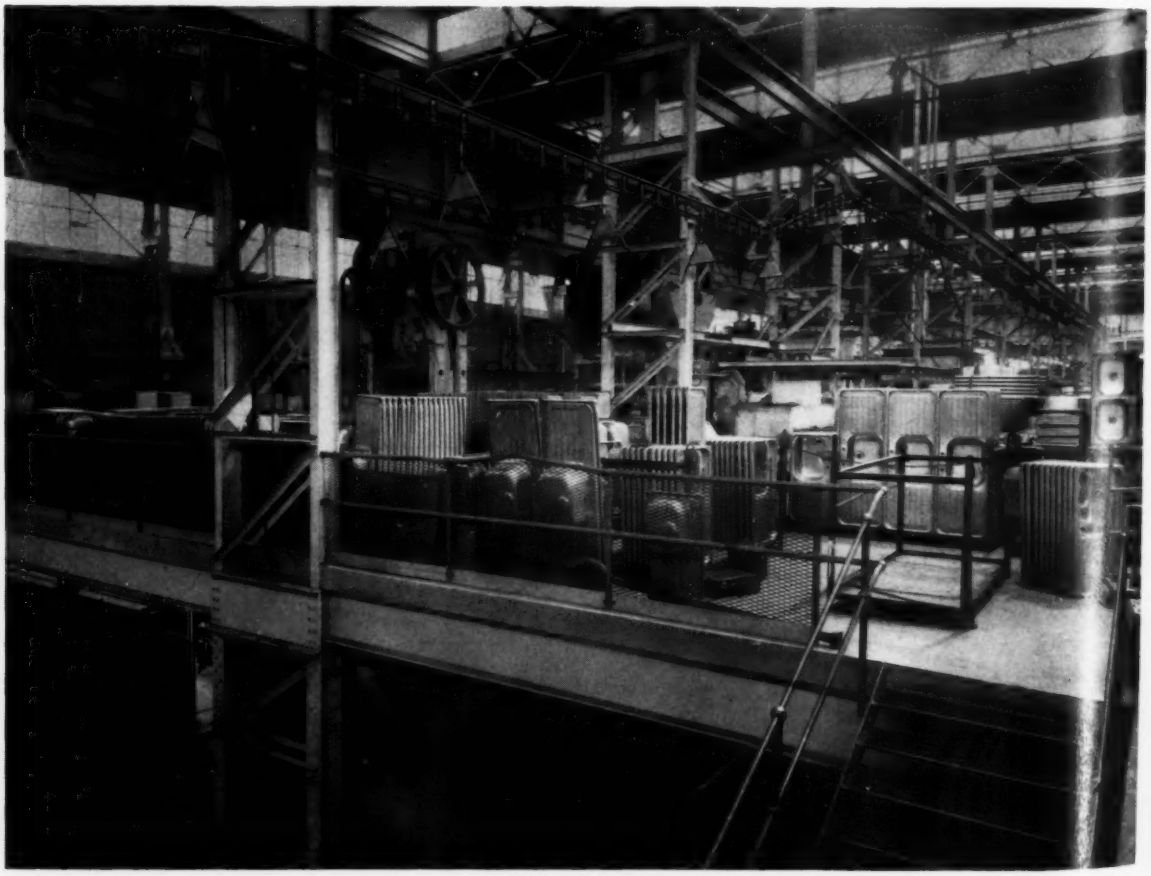
Of course the process and storage conveyors by keeping the work moving from point to point assist transport, but those conveyors used solely for interoperational transport are:

Meadow Lane Works

Conveyor No. 1, the shop conveyor, round the first floor presses to the ground floor.

Conveyor No. 2, the degreaser conveyor, round degreaser and welding.

Fig. 18. Meadow Lane before the new conveyor



Nottingham Road Works

Conveyor No. 3, the shop conveyor, from the ground floor to first floor shot blast and down to grip coat.

Conveyor No. 8, the warehouse conveyor, from ground floor to first floor.

Conveyors used for Storage

The total effect of all the conveyors is to keep stock in the air on the conveyors as opposed to it standing on the floor. This is particularly notable in the enamelling division at the Nottingham Road works, where it is quite a rare occurrence to see a sink on the floor. But, as a natural corollary, the air space overhead gives the impression of being full of sinks progressing smoothly in a great number of different interweaving directions. But those conveyors used mainly for storage are:

Conveyor No. 6, the shop conveyor on the ground floor at Nottingham Road enamel shop, assembling work after grip coat drying and before furnacing.

Conveyor No. 9, the service conveyor on the first floor at Nottingham Road assembling work prior to finish spraying, the special interest of which has already been mentioned.

Conveyors correcting operational sequence

One of the important features of the Leisure organization's use of conveyors is the inter-connection of succeeding operations directly by conveyor even in cases when they are geographically far apart. There are some striking instances of this:

Conveyor No. 2, this permits each piece of work at the presses to be taken direct to the next pressing operation even though this may be on the other side of the shop.

Conveyor No. 3, this conveyor maintains transport direct from operation to succeeding operation by taking it from the ground floor to shotblast on the first floor, from which it descends to the ground floor for work to be grip coat dipped.

Conveyor No. 8, this is perhaps an outstanding example of maintaining correct operational sequence by conveyor. It takes work from the ground floor firing furnace several hundred feet to the first floor spray and furnace area, subsequently returning with finished work to the ground floor warehouse.

Fig. 19. A typical Leisure sink

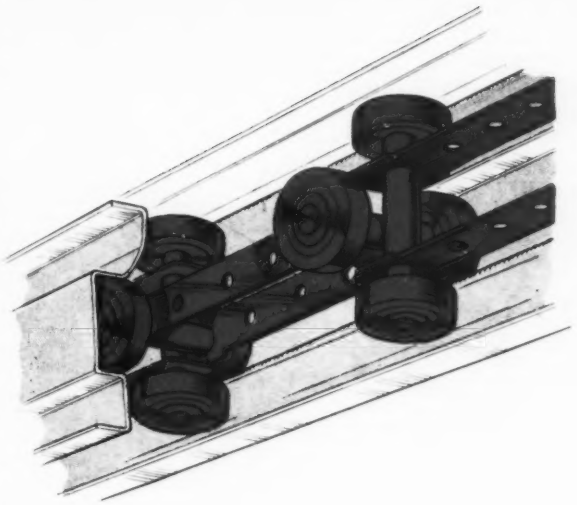


Fig. 20. Showing the arrangement of guide wheels on the 'Flow-link' overhead conveyor

This is a particularly notable application since it shows how a sequence of work in order of the planned sequence of operations may be established even though the position of the operations on the floor are not in a corresponding sequence. In the case of Conveyor No. 8, for instance, no less than five other operations are by-passed in taking the material from the ground floor over to the first floor spraying department.

Conveyors Used for Drying

A number of these conveyors take work through dryers, such as:

Conveyor No. 5, grip coat dryer

Conveyor No. 10, spraying and subsequent overhead drying.

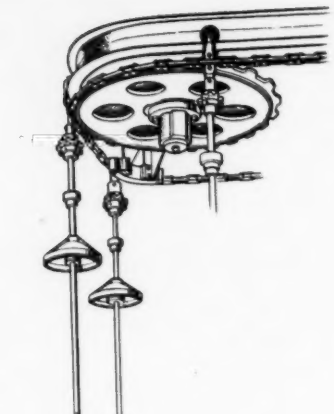
Conveyor No. 8, final drying of sound deadening coat before delivery from the first floor to the ground floor of stainless steel sinks.

In addition, however, a considerable amount of time is spent passing through the air after grip coat drying, the ware having been transferred from Conveyor No. 5 to storage Conveyor No. 6 prior to fusing through the furnace on Conveyor No. 7.

The Common Purposes—High Output and Quality

By keeping material constantly moving the operators have every chance of being continuously fed with work and a high output can be expected. This is borne out in practice at the Leisure works. No less than 6,000 sinks are despatched every week from the enamelling lines described above, a number which will reach 8,000 in times of good steel supplies. There is no doubt that these conveyors have greatly contributed to a full load and a fast throughput.

As a result of the work being housed on the conveyors very little is stacked on the floor. A glance at Fig. 18 will give some impression of how crammed these shop floors can look without a conveyor system; Fig. 18 in fact is the press division at Meadow Lane before the conveyor was working.



LEFT
Fig. 21. Arrangement for rotating and hanging sinks on the shot blasting conveyor

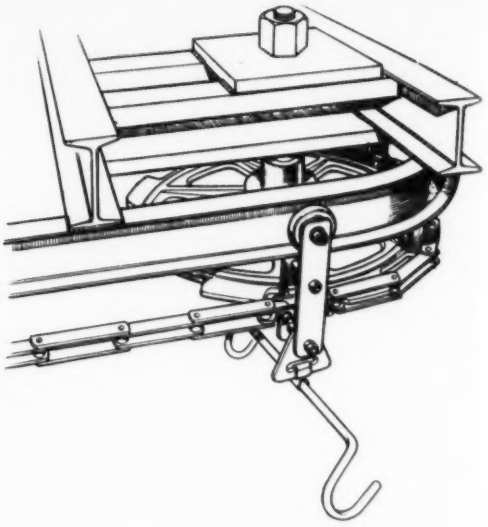
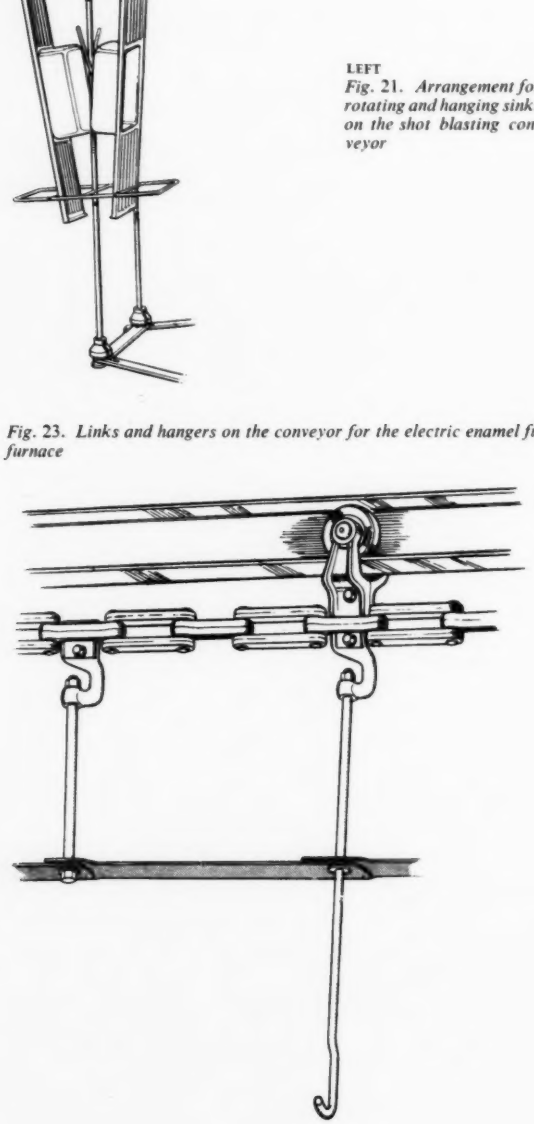


Fig. 22. Links and hangers on conveyor No. 3

Fig. 23. Links and hangers on the conveyor for the electric enamel fusing furnace



Figs. 4 and 5 illustrate how the floor is cleared by a conveyor system. It could be asked what material advantage arises from such a clear floor: some of the assets derived from it are:—

(i) Increased safety from the absence of objects for operatives to fall over.
(ii) Faster production since work does not pile up.
(iii) Improved production control since a responsible person can quickly see bottlenecks should work accumulate anywhere.
(iv) Good housekeeping and pride in tidiness.
(v) Easier handling of any goods to be moved since there is less obstruction.

It is naturally advantageous that man-handling and man-hauling is reduced. Although there are between 24 and 30 man-lifts on and off conveyors in the present layout, it has to be appreciated that without the conveyors there would have been an enormous amount of trolley pushing and lifting on and off trucks probably in much heavier packs. The secret of the success of this conveyor system is that it enables work to be moved in units non-stop. The advantage in handling is that the lifts are light and there is no man porterage, all movement being by conveyor. Output per man is consequently very high.

Apart from reducing the exhausting aspects of manual labour to the minimum, one of the gains from this conveyor system is the delicate movement of work which has only recently received a relatively delicate coat. It will be appreciated that the conveyors contribute considerably to the reduction of damage, which would otherwise be inevitable with man-handling between operations.

The resultant sinks are well-known for their high quality of workmanship and finish, as may be seen in Fig. 19.

Conclusions

It is accordingly quite clear that at the works of Leisure Kitchen Equipment, Ltd. of Long Eaton, is a complex conveyor system in which individual conveyors serve widely different purposes. The total effect, however, is to provide a very fast output of a very high quality product.

Our acknowledgements are due to Leisure Kitchen Equipment, Ltd. for permission to secure and publish this article and to Mr. G. E. Richards, managing director and Mr. W. L. Smart, works manager, for providing the necessary data.

BREWERY EMPTIES AND FULLS HANDLED WITHOUT HANDS

By A. T. Gaudreau*

MILLIONS of beer cans and bottles received empty and shipped full in cases throughout the year are handled entirely by mechanical devices at the Lone Star Brewery Company in San Antonio, Texas, U.S.A. By recently modernizing its bottle shops and warehouses to palletize its handling operations of beer containers, it became, it is claimed, the first converted brewery on record to dispense with all manual handling throughout the brewery manufacturing and warehousing cycle. Except for attendants needed to operate some of the non-automatic machinery and handling equipment, manual workers are no longer used in these operations and have therefore been assigned to more productive duties elsewhere in the plant.

The handling of bottled beer represents a two-way movement consisting of (1) the inbound return shipment of empty bottles in cases, and (2) the outbound shipment of full bottles also in cases. Although canned beer does not involve a return shipment of empties, it nevertheless also represents a two-way movement in (1) the receipt of empty cans, and (2) the shipment of full cans in cases. For both types of beer containers, therefore, there is both an inbound movement of empties and an outbound one of fulls.

It is largely the standardization and synchronization of the operations of receiving empty cans and bottles in bulk or reshipper cartons, and of shipping them out filled with beer and packed in cases, that pave the way for wholly mechanized handling. These operations may then be integrated into a plantwide handling system which usually marks the distinguishing point between an efficiently automated brewery and a manually operated one. And this automated brewery can be fitted into existing buildings, as was done at Lone Star, almost as readily as inside new ones designed especially to accommodate the automatic handling system.

1

Fig. 1. Return load of empty bottles being fed into automatic lift at right. After picking up the pallet load from inside trailer body at dock in left background, fork truck is depositing it on conveyor apron. The load is automatically fed into the vertical lift which in turn automatically raises it to the second floor

Fig. 2. Pallet loads of empties being automatically delivered on second floor by vertical lift in right background at the rate of one load a minute. For loads of 48 cases each, this delivery amounts to 2,880 cases per hour. Load left foreground is making a right-angle turn before entering case depalletizer to the right outside of picture

2

Bottling, canning and case-packing constitute the final phase in the processing of beer, and mark the starting point of case-handling operations in a brewery bottle shop and shipping warehouse. With the transition from manual handling to palletized handling, the concept of the unit load moved at each handling changed from a one-case unit to a one-ton unit 50 times greater. This king-size unit, namely, the pallet load, can be handled readily with the assistance

*Consultant Gaudreau Associates Weston, Conn.

Fig. 3. Parade of pallet loads moving automatically into depalletizer in left background. These loads can be intercepted by fork trucks for warehouse storage when necessary, or supplemented by storage loads when necessary, or supplemented by storage loads when incoming flow from carriers on floor below is not adequate to keep the depalletizer operating at desired speed (Alvey Conveyor Manufacturing Co.)

of new devices. These consist of fork lift trucks, case palletizers, automatic interfloor lifts, case depalletizers, bulk can depalletizers, carton packers, and powered pallet conveyors. By interposing these handling devices at strategic points along the round-trip flow of cases from incoming to outgoing carriers, cases no longer need be handled manually at any point in this brewery.

By a proper adaptation of existing buildings to the structural requirements needed by the latest-type mechanical handling devices, none of the operational advantages of these devices have to be sacrificed. In other words, it is not necessary to construct new brewery buildings in order to take full advantage of these new types of palletization handling equipment.

The workability of the new handling system within existing buildings is inevitably the criterion in modernizing existing buildings. Optimum investment for building alterations and for the purchase of new handling equipment are other basic factors in modernization. This investment should pay for itself out of savings within a two-year period of operations.

Ceiling clearances required in storage areas should be high enough to permit stacking 6-ft high pallet loads two or three tiers high, plus about 18 in more for water sprinklers and load-manœuvering. In some low-ceilinged multi-story buildings, this may mean tearing down intermediate floors to permit economical high-tiering of pallet loads.

Among the principal factors considered in re-designing the brewery layout at Lone Star to permit the palletization of cases and bottle-shop supplies are the following ten: (1) Congestion in interfloor conveyor runs due to inflexibility of one-way flows; (2) cube space lost to overhead conveyor lines; (3) cube space lost to low stacking of pallet loads because of limitations in floor-load capacities; (4) removal or relocation of structural columns along the path of main traffic aisles for fork trucks; (5) cutting aisle doorways through building walls; (6) erection of unloading and shipping docks; (7) installation of automatic lifts for transporting pallet loads without interruption between floors; (8) load-bearing capacity of existing floors to withstand the heavier storage of palletized loads and traffic of heavy fork trucks; (9) direction of building and property expansions; (10) vehicular approaches to buildings and yard facilities for carrier movement.

The problem of interfloor handling inherent to most existing old brewery buildings has been virtually eliminated through the medium of automatic, fast-operating, vertical conveyor lifts. With such a unit, incoming pallet loads of returned cases of empty bottles, as well as of such bottle shop supplies of bottle crowns in cartons and caustic soda in drums, can be spirited away up or down to another floor at the rate of one load a minute. No longer is it necessary to wait for slow-moving freight elevators, nor to suffer traffic congestion at these points. In fact, many of these old elevators have been dismantled in palletized breweries and their shaft taken over for housing automatic vertical lifts capable of handling loads of 3,000 lb and over.

The Lone Star Brewery is in the million-barrel-a-year class and, in addition to catering throughout the State of Texas, does an increasing volume of business in bordering states. It operates four bottle lines and two can lines in two separate bottle shops with warehouse on the second floor of each one.

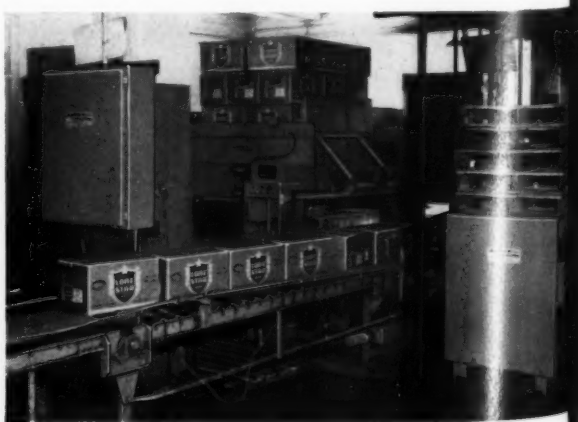
No new buildings were required to convert this brewery from a case-by-case to a ton-by-ton handling basis through palletization. The structural alterations necessitated by the modernization programme were all made on the outside of the buildings thus leaving their interiors virtually untouched except for elevator replacements.

Returned Bottles Handled in Palletized Cases

Cases of returned empty bottles are received, for the most part, in palletized loads on highway trailers, rail cars, and city route trucks. Cases received hand-stacked on carrier decks are transferred on to pallets inside the carriers before being unloaded so they can be handled by fork truck beyond that point. Pallet loads of empties returned to the brewery range from 5 to 7 layers in height depending upon the inside height of the trailer body. When received in boxcars, the loads are usually 8 layers high.

When a highway trailer has been received at the dock and made ready for unloading, a fork truck is driven inside the

Fig. 4. Breaking down pallet loads into stream of individual cases of empties at the case depalletizer in centre background. Pallet loads arrive from the left by infeed conveyor. Each load is clamped and lifted to free the bottom layer until all layers have been dispatched into the stream of individual cases in left foreground. Empty pallets are automatically stacked as shown at right



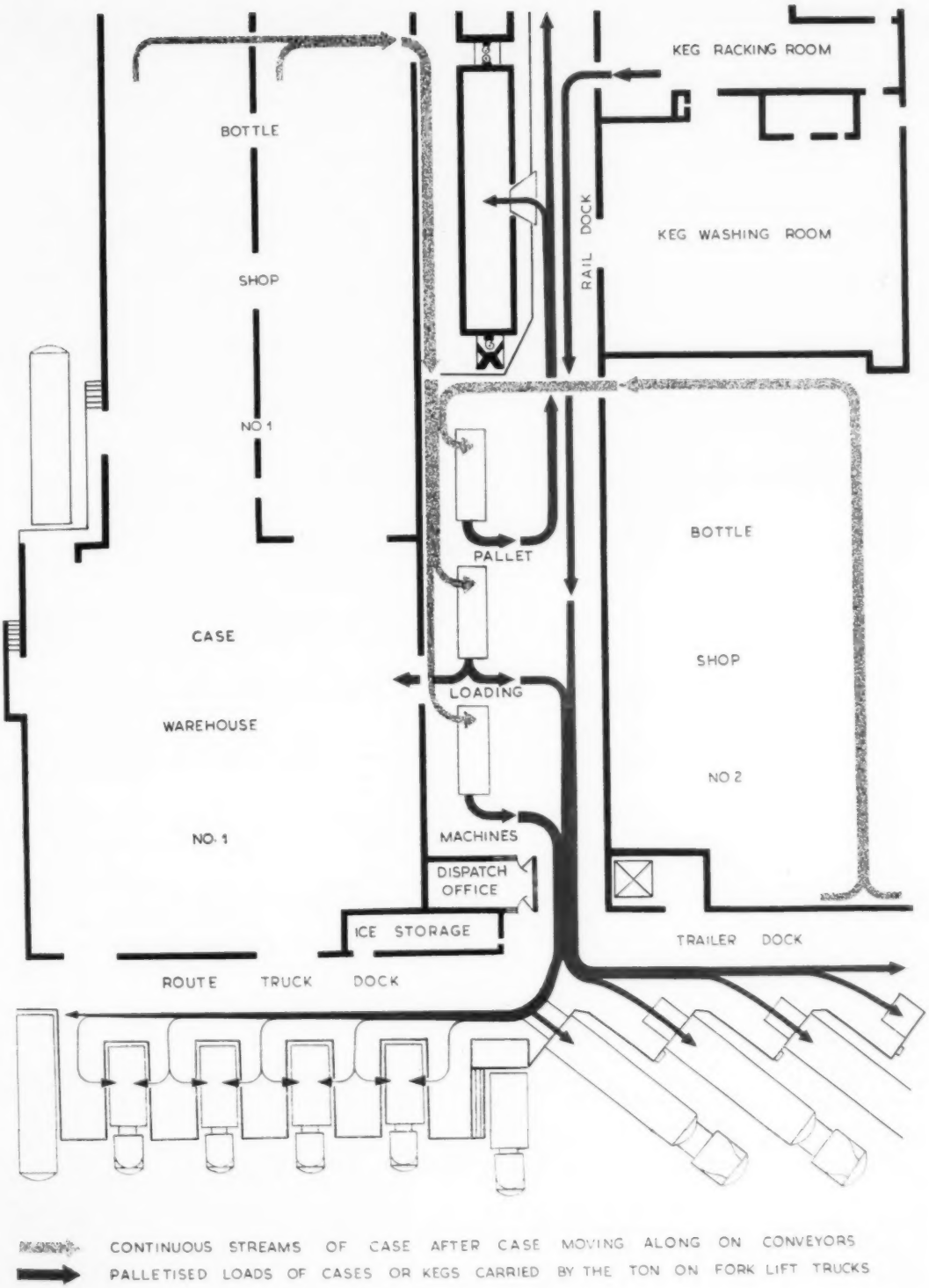
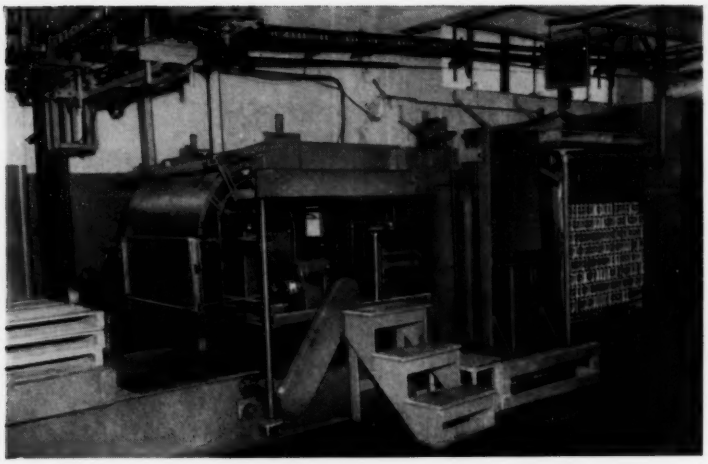


Fig. 5. Flow chart of empties and fulls moved mechanically. Empties are trucked from dock to vertical lift on trailer dock. Fulls from the two bottle shops converge at the pallet loading machines in centre located between truck docks and rail dock. Pallet loads of fulls are trucked direct from palletizers to case warehouse on left or to shipping docks at either end of palletizing area (Gaudreau Associates)



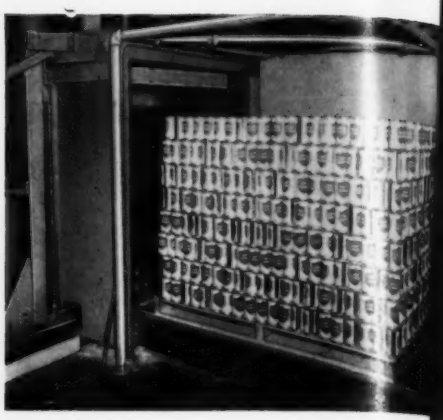


Fig. 6. (Above) Feeding pallet loads of bulk cans from road trailer spotted outside receiving door at right. Double-tiered stack at extreme right consists of two pallet loads in corrugated overwraps as unloaded together on roller conveyor at tailgate of trailer. Loads are de-tiered by fork truck, unwrapped, and fed singly into depalletizer as shown here (American Can Company)

Fig. 7. (Above right) Pallet load of bulk cans entering depalletizer at left by means of powered chain conveyor on which the pallet is riding after having been deposited there by fork truck. Preceding pallet is in upraised position near the inside top of the machine (American Can Company)

trailer body, picks up a pallet load of empties, and backs out on to the truck dock. The fork truck then travels a short distance on the dock and deposits the load upon the intake conveyor apron of the nearest conveyor vertical lift at the dock end of the bottle shop as illustrated in Fig. 1. Two Alvey automatic conveyor lifts of the type shown here elevate the pallet loads of empty bottles to the second floor of the bottle shop.

Upon reaching that floor, the vertical lift automatically discharges the pallet load on to a powered accumulating conveyor, Fig. 2. These vertical lifts contain an automatic control panel which can be set to a definite pattern of travel. For example, they elevate a load of empties or fulls to the second floor, discharge their load, and return empty to the first floor. Or they elevate a load of empties and return with a load of fulls from second-floor storage. One minute is all that is needed for each round trip.

The successive loads of empties emanating from the vertical lift in this illustration are travelling on a powered roller conveyor which is rounding a corner on its way to a case depalletizer located towards the right, outside of the picture. Looking at the same conveyor while standing at the vertical lift in the right background, a whole row of pallet loads of empties approaching the curve in the conveyor may be observed in Fig. 3. The loads accumulated in the straight run on the right may be picked up by fork truck as they reach this point and trucked to the storage of empties on this floor now connected to both bottle shop buildings by the newly constructed truck causeway.

Since this discharge conveyor from the vertical lift is connected directly to the case depalletizer seen in the left background of the picture, the pallet loads which did not have to be picked off the accumulation conveyor at the right for storage are allowed to proceed around the curve in the conveyor and enter automatically into the depalletizer. This arrangement eliminates the need of using fork trucks to transfer pallets from the incoming flow of loads to feed into the depalletizer.

This automatic case depalletizer, originated by the Alvey Conveyor Manufacturing Company, feeds cartons of empty bottles to three individual conveyors seen circling overhead in the centre background and over the depalletizer on the left. These Alvey conveyors supply the four bottle production lines on the floor below in the two bottle shops. The depalletizer unloads cartons of empty bottles by being automatically fed with a pallet load such as the one approaching it in the centre of the picture. The live-roller lift table below the clamping arms of the depalletizer as exposed here is about to discharge the last row of cartons from the layer being depalletized.

When a pallet is first positioned inside the depalletizer, the roller table rises to allow the two side clamping arms to grasp the entire load of cartons off the wooden pallet. The grasped load remains elevated while the lift table is lowered automatically to permit the empty pallet to be discharged on to the automatic stacking device. This unit will be noted at the extreme left already holding a supply of seven empty pallets ready to be picked up by fork truck and be carried to the vertical lift which will return the stack to the first floor for shipping purposes.

Fig. 8. Production lines feeding full cases directly to palletizers located between truck dock in left background and rail dock adjoining at bottom centre (see Fig. 5). All palletizers can be fed from any of the can and bottle case conveyor lines shown overhead. Production lines of the same product are merged before reaching this feeder network of conveyors

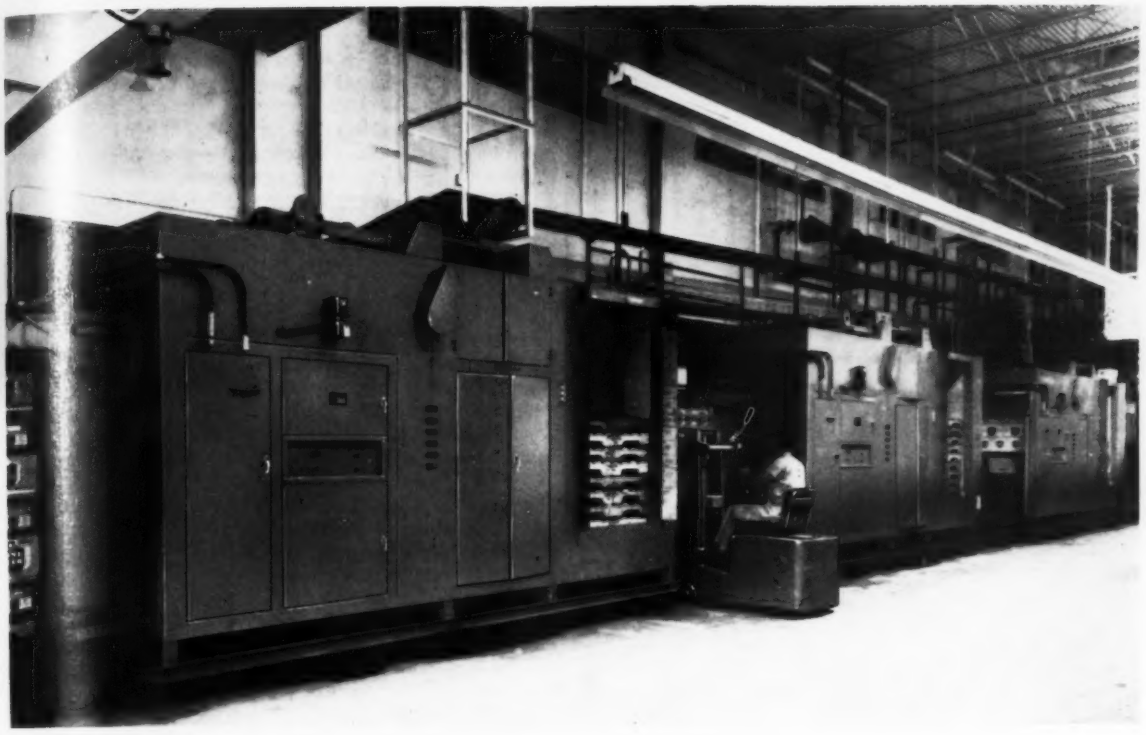


Fig. 9. Palletizers disgorging pallet loads of full cases for fork trucking to storage or shipment seen picking up a load from machine in centre. These machines work automatically without operators. At this point fork trucks take over the handling and transport the pallet loads into the warehouse or directly inside outbound trailers and boxcars (Alvey Conveyor Manufacturing Co.)

Empty Bottles and Cans being Depalletized

The lift table and clamping arms already shown in Fig. 3 operate simultaneously. The arms grasp and raise the load and leave the bottom layer of cases free on the lift table which returns to its lower position for the cases to be discharged on to the conveyor line seen between the depalletizer and the pallet-stacking device. A closer view of this operation is given on the other side of the depalletizer in Fig. 4. This layer-by-layer discharging operation is continued until the top layer of the load has been removed.

As each layer of cases is discharged on to the conveyor line in the foreground, the cases pass through a case-pivoting device on the depalletizer which makes them all head lengthwise as seen here. From this automatic discharge point, the cases of empty bottles are dispatched in a steady stream towards the left to be fed into one of the overhead conveyor runs leading to the bottle soakers downstairs in the bottle shops. By means of push buttons the depalletizer operator directs the flow of depalletized cases from one conveyor run to another depending on which one is running out on cases.

Empty bottles are inspected for defects while still in their cases before entering the conveyor of the automatic uncasing unit of the bottle soaker at the start of each bottle production line in the bottle shop. The carton uncaser automatically unloads the bottles by means of 24 mechanical grip fingers which gently remove each bottle from the carton and places them on the accumulating table at the intake feed of the soaker.

The empty cartons are conveyed to carton cleaning operations on their way to the packing machines at the end of each bottle production line to be filled with full bottles of beer coming off the production lines. These filled cases then move by conveyor to a battery of three case palletizers centrally located in the newly acquired floor area joining the two bottle shops.

The handling of incoming and stored empty beer cans has always posed a seemingly insurmountable problem because of the fragile state of these containers. The practice for years has been to pack these empty cans into reshipper cartons at the can factory, and to hand-stack these cartons roof-high inside boxcars or highway trailers for shipment to the brewery.

At the brewery it became necessary to set up a network of portable conveyor sections leading from inside the boxcars and trailers. These conveyor runs cut across shipping docks thereby blocking passageway for fork trucks and other dock traffic. They extended down long lanes to connect with building-mounted powered conveyor runs which led to can-uncasing and unscrambling machines. The emptied reshipper shells then had to be carried in endless streams by conveyor to can packers. Furthermore, the handling of these reshipper cartons of incoming empty cans necessitated permanent crews of throw-on and throw-off men along these conveyor lines, particularly when the cans had to be stored before being fed into production.

A method of dispensing entirely with the need of reshipper cartons, case conveyor lines, manual case handling, can-uncasing machines, and can unscramblers in the receipt, storage and feeding of empty cans is illustrated in Fig. 16. This picture shows the bulk-can handling system developed for truck delivery of cans by the local can factory of the American Can Company. The cans arrive in pallet loads tiered two high on the trailers, and enclosed by a corrugated overwrap as seen entering the receiving door over a roller conveyor at the extreme right of the picture.

This floor roller conveyor is at exactly the same height as, and connects with, the roller conveyor bed in the deck of the trailer outside the door. A slight push of this lightweight

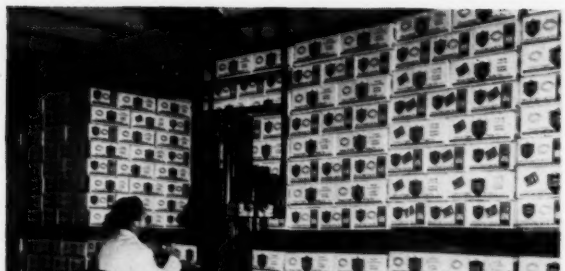


Fig. 10. Storing pallet loads of fulls as picked up from palletizers. Ceiling in warehouse permits stacking two loads high. Loads of empties are likewise stacked in storage on second floor when awaiting to be fed into case depalletizer from case-by-case conveyor delivery to soakers in bottle shop (Lewis-Shepard Products, Inc.)

two-tier stack of empty cans rolls it into the building within access of a fork truck. The truck de-tiers the pallet loads and places them, one at a time, against a squaring board as shown behind the exposed load positioned on the feed apron conveyor of the can depalletizing machine.

The overwrap is removed and the load backed up against the squaring board to straighten up the sides of the loose empty cans making up the load. The loads are 48 in high and made up of nine layers of 350 cans, or of 3,150 cans per pallet. Each layer is separated by a sheet of chipboard such as seen piled on a pallet on top of the machine, and directly above the open load. When not fed directly into the machine, the pallet load is picked by fork truck and delivered into tiered storage near the machine area.

A pallet load of bulk cans being fed into the can depalletizing machine is shown in greater detail in Fig. 7. The chipboard separating each layer of cans is clearly visible in this picture. The load is entering the depalletizer seen at the left as it is being moved by a powered chain conveyor imbedded in the feed apron. The lift table inside the machine will raise the load as each layer of bulk cans is swept off its respective chipboard by a pivoted arm pushing off the top layer as the load reaches the top of the machine.

Returning again to Fig. 6, it will be noted that the machine is equipped with a stainless steel mesh belt at the top directly above the three wooden steps seen here. The swinging arm operating horizontally on this belt pushes the loose cans which are conveyed into the curved chute at the left end of the machine. The cans cascade down this chute from a vertical position at the top of the machine into a horizontal one, one row above another, as they reach the bottom level of the cascading chute. At this point, the cans are fed in a continuous stream into the vertical cable conveyor in the left background which connects with the horizontal cable conveyor overhead leading to the can filling machines.

This machine is easily operated by one man, and feeds a supply of empty cans via cable conveyor directly to a can filler at a speed of 600 cans/min. It is operated by push-button control by the machine attendant. In addition to the operator of the can depalletizer, the only other worker needed to complete the flow of cans from incoming trailer to can filler is the fork truck operator who unloads the trailers, handles the pallet loads of cans in and out of storage, and feeds these loads into the unloading machine.

Thus all incoming bottles and cans are unloaded, stored, uncased, depalletized, and fed singly in continuous streams into the production lines in the bottle shop without the intervention of human hands throughout the cycle. The efforts of the workers are now confined to the operation of the machinery and handling equipment.

Production Runs of Full Cases Automatically Palletized

Filled cases of bottles and cans are counted mechanically before leaving the packers and entering the shipping department conveying system. The filled cases can now travel in endless streams by conveyors over practically any shape or angle of desired path, such as around 90-deg turns, up and down interfloor inclines, through wall openings, and overhead above machinery and equipment. The product is conveyed with automatic traffic controls, photo-electric cells, solenoid-controlled pressure stops and hinged-belt conveyors to one of the three palletizers shown in Fig. 8.

The automatic palletizing machine is at the heart of all palletized shipping operations. This machine receives an accumulated stream of individual cases of one given product at a time directly from the production conveyor runs terminating overhead above the battery of machines. The palletizer contains an electronic panel connected to photo-electric cells, micro-switches, and timing equipment. These govern the entire operation of stacking in accordance with a preset layer-arrangement of one of various patterns depending on case dimensions.

All three of these Alvey palletizers can be fed from any of the can and bottle case conveyor lines operating overhead in the top background of the picture. When the same product, such as 12-oz export bottles, is arriving on two or more production lines, these runs are merged before reaching the conveyors feeding the palletizers.

Filled cases of bottles or cans of a given product enter the top side of the palletizer where electronically controlled conveyors and mechanical components make up each tier of the pallet load as seen in the centre foreground in one of the machines in Fig. 8. Empty pallets are fed automatically as needed from a stacked supply contained in a special magazine at the rear of the machine.

From this pallet stack, the empty pallet is fed automatically on to a hydraulic table which rises to receive the first layer. After each layer has been received, the table sinks down just low enough to permit the next layer to slide over the one just placed on the growing load. This operation is repeated until the correct number of layers have been built into the load. The full pallet load is then automatically discharged by the machine on to a floor conveyor apron. A load which has been thus discharged may be noted in the left centre of Fig. 8.

The central strategic position occupied by the battery of palletizers in the plantwide flow of filled cases is shown on the flow chart in Fig. 5. The machines have been installed on the newly constructed floor connecting the two bottle shops into a continuous floor across the trackway formerly separating the buildings. Since this area has also been covered by a roof, it functions as the link which integrates the two bottle shops into an individual structure.

Fronting the combined length of these three structural components along the side facing the yard roadway is the new elevated truck shipping dock built to accommodate the shipment of the pallet loads coming out of the three palletizers. This dock is shown in part along the bottom edge of the flow chart. The rail dock, on the other hand, may be noted at the top centre of the chart, and at the other end of the centrally located battery of palletizers. By this arrangement, pallet loads from the palletizers may move

either towards the rail dock at one end of the bottle shops or towards the long truck dock at the other end.

Production conveyor lines carrying streams of filled cases of bottles and cans from the bottle shops situated on both sides of the palletizing room are indicated in cross-hatched flows on the chart. The conveyor flows which start near the truck dock all swing up towards the rail dock where they begin to merge as they approach the palletizers situated at the waist-line of the hour-glass plantwide flow set up in this brewery. The lower part of this hour-glass design flares out from the bottom end of the palletizing centre and bifurcates toward the route truck door on the left and the trailer dock on the right.

Pallet loads in the process of being discharged by palletizers and in turn picked up by fork trucks are illustrated in Fig. 9. The palletizer on the left shows a load already discharged on to the conveyor apron ready for removal by fork truck. At the opposite end of this palletizer, and as seen in the centre foreground, is the magazine compartment containing the stack of empty pallets which are fed automatically, one after each load has been completed.

The fork truck in the centre is picking up a pallet load of filled cases which has been discharged by the palletizer on the right of the truck operator. This load will now be transported directly to the truck dock towards the left, or to the rail dock towards the right. Loads intended for temporary storage in the case warehouse in back of the palletizers are discharged from the opposite side of the conveyor aprons by fork trucks operating directly from inside the warehouse without having to travel around to the shipping side of the palletizers as seen here.

In the third palletizer at the extreme right of the picture is a pallet load in the process of being built up inside the machine. It has reached the stage where three layers have already been placed on it. It will continue moving downward until it has received the top layer.

Fig. 11. Picking up two pallet loads of filled kegs in keg-racking room where they have been filled and stacked four loads high at refrigerated temperature. Keg-room door opens automatically as fork truck approaches it from outside, and closes automatically as truck leaves the room

Storing and Shipping Full Cases Mechanically

Pallet loads not destined for immediate shipment, as already pointed out, are fork-trucked individually from palletizer discharge conveyors to preselected storage areas on the same floor level as that of the palletizers, namely, on the first floor of the case warehouse near one of the bottle shops. For storage areas used for filled cases on the second floor, the pallet loads are transported directly by fork truck from the palletizers to one of the two automatic vertical lifts. When the loads reach the second floor, they are picked up and stored by fork truck. The ceiling height on both floors in the case warehouse permits stacking the loads two high as illustrated in Fig. 10.

In loading highway trailers with palletized loads, consideration must be given to the range of sizes and floor conditions existing in distributors' trailers calling regularly at the brewery. Another factor of prime importance is the type of facilities available at distributors' warehouses for handling palletized case loads. For road trailers and city route trucks, a pallet load accommodating six cases in height, eight cases per layer, was found most practical for 24 12-oz bottles. Overall height of such a load, including pallet, is 64 in. Its overall weight, again including the pallet, is 2,038 lb, or approximately one ton.

For rail cars, however, the 6-layer pallet load would cause a shortage in minimum carload weights. In reefers (refrigerated cars) the load would be short by one layer to meet minimum carload weight of 75,000 lb required in many areas to obtain the carload freight rate. In boxcars the 6-layer load would be short by two layers, or by 25 per cent, to attain allowable carload weight which permits shipping this cargo eight cases high. A simple adjustment on the palletizing machine, however, will cause that unit to turn out 6-, 7-, or 8-layer loads as desired for shipment.

After palletization at the machines, the pallet loads of cases scheduled for immediate shipment by truck are picked up by fork truck and transported directly to outbound carriers. Palletized stock taken out of storage is likewise fork-trucked to outbound carriers. This applies also to the shipment of palletized beer kegs out of the keg-racking room as illustrated in Fig. 11. Palletized loads delivered to the shipping docks are fork-trucked bodily into boxcars, reefers, road trailers, and into the sides of city route trucks.

Each pallet load of export beer, as previously mentioned, contains 48 cases and weighs slightly over 2,000 lb, including the weight of the pallet. It takes but 20 of these one-ton pallet loads to fill a 40,000-lb trailer, and less than 20 minutes for the entire operation when loads are carried bodily inside trailers by means of powered fork trucks as illustrated in Fig. 12. Loaded carriers then transport their lading to destination and bring back pallet loads of empties on their return trip. These returned empties start the round-trip case-handling cycle all over again.

The 34 in × 44-in block-type pallet used in this installation permits two different stowing patterns for obtaining optimum loading on trailers. For vehicles having an inside clear width of 90 in or over, the loads are stowed two-wide with the 44-in dimension crosswise of the truck. Trailers with an inside clear width of less than 90 in are still in the majority, however, especially in the older fleets. In these trailers the loads are also stowed two-wide, but only by alternating the 44-in side with the 34-in one in the two loads positioned abreast of each other. In other words, the 44-in dimension is placed crosswise for one load, and the 34-in side crosswise for the load abreast of it, thus taking up only 78 in of the internal width of the trailer.

Storage areas are maintained in the case warehouses to equalize the feeding of empties into the bottling lines, and the loading of fulls on the shipping docks. When the intake of empties flows from inbound carriers directly into the bottle-shop soakers, the empties are considered to be on a 'run-through' basis since they do not touch the storage areas for empties. On the return journey, when the output of filled cases flows from the bottle-shop packers directly into outbound carriers, the fulls are also on a 'run-though' basis since they likewise do not touch the storage areas.

In setting up the case-handling modernization plan at this brewery, the run-through principle was made a primary objective wherever it could be developed and applied in the handling of both empties and fulls. This called for a considerable amount of adjustment and reconciliation in the timing of production runs of specific case goods to coincide with the time and quantity of the loading of these identical products in boxcars, reefers and trailers. Keeping bottle and can lines running directly into outbound carriers, without having to resort to storage areas for absorbing over-runs or supplying shortages, except for impending holidays, became the keynote in synchronizing the planning of production and shipments.

Distributors now send in their orders for an entire week, a few days in advance of that given week. These orders are immediately summarized for each shipping day by products, and by individual carload and truckload. Using these shipping requirements as a basis, plus whatever stock may be on hand, a daily production schedule is set up for each working day in the following week.

To carry out these shipping schedules and avoid flooring the output, a dispatch office is maintained at a central point in the shipping warehouse, next to the palletizing machines, as already shown on the floor plan in Fig. 5. The daily shipping schedule, broken down by carriers, and by products for each carrier, is revised each morning to make adjustments for deviations made from the previous day's schedule.

A running inventory is kept of each product from day to day which tells the dispatcher at all times exactly how many cases of any product are on hand in the morning, how many are being produced and shipped on that day, and what the closing balance will be at the end of the day. He has this information at his finger tips for the entire variety of products throughout each of the two shifts that the plant is operating.

Thus by a co-ordinated plant-wide system of handling empties and fulls, both in cases and in bulk, through pre-scheduling, electronic controls, and automatic handling machinery and equipment, the Lone Star brewery has succeeded in placing all of its handling operations on a mechanized basis.

Manufacturers of Principal Equipment

Fork lift trucks: Lewis-Shepard Products, Inc., Allis-Chalmers, Buda Division.

Case palletizers; automatic interfloor lifts; case depalletizers; powered pallet conveyors; overhead carton conveyors; roller conveyors; automatic traffic controls; solenoid-controlled pressure stops; electronic control panels; production conveyors: Alvey Conveyor Manufacturing Co.

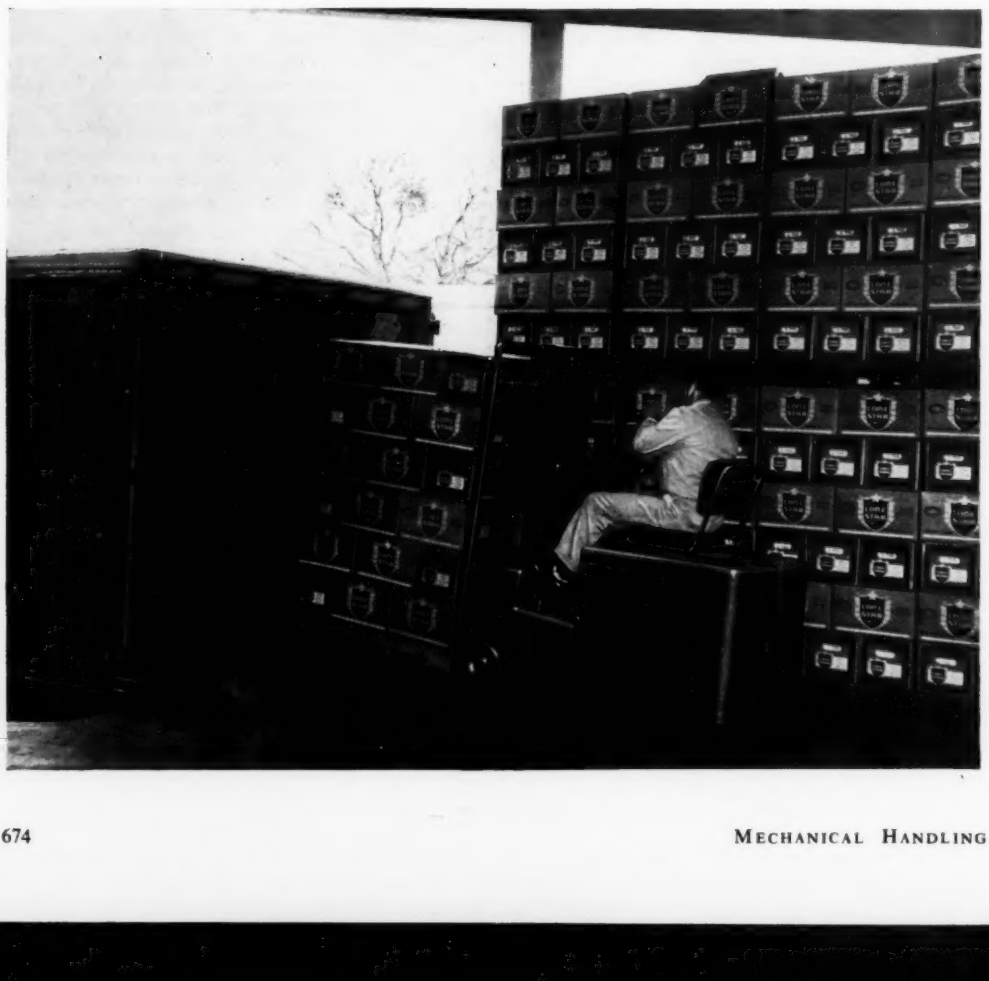
Bulk can depalletizers; bulk can handling system; cable conveyors: American Can Co.

Carton packers: R. A. Jones & Co.

Carton uncasers: Atkron, Inc.

Pallets: Local supplier.

Fig. 12. Trucking pallet load directly from dock level into trailer body with ample clearance above operator's head as truck enters tailgate doorway. Pallet loads at right represent overflow from production lines at case palletizers located in background towards the right



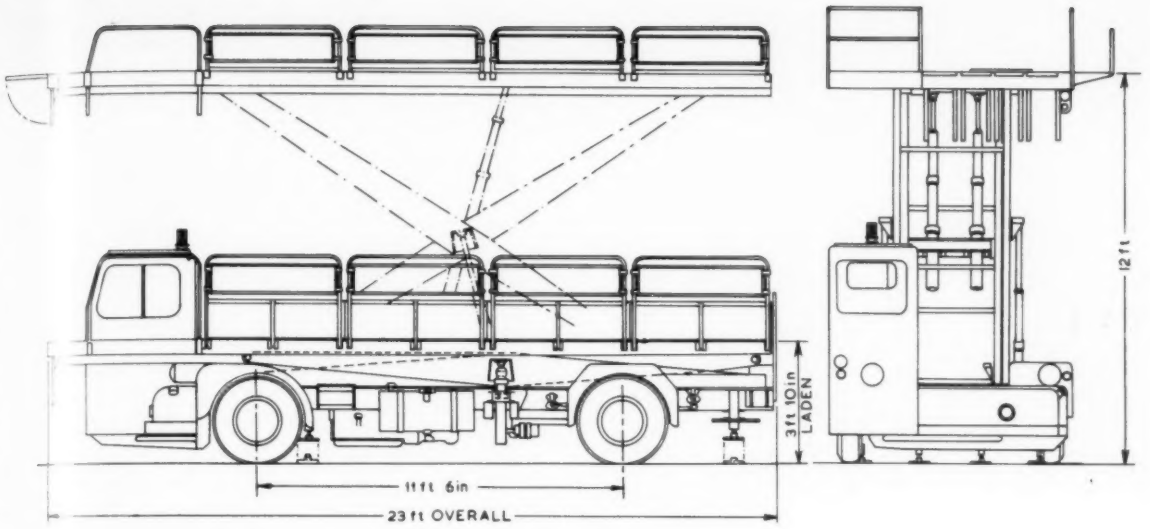


Fig. 1. Overall dimensions of the aircraft loader

THE DENNIS AIRCRAFT LOADER

This machine, the result of extensive study and development by Dennis Bros., Ltd., offers efficient and reliable aircraft load handling for the present and future generation of aircraft. It has been designed to comply with a Ministry Specification which states that it should combine three functions: 1, to carry passenger baggage for at least 50 passengers; 2, to carry catering service trailer, maximum weight loaded 25 cwt; 3, transport freight up to its maximum capacity.

The chassis is a development of a Dennis heavy-duty under-floor-engined design, using the Perkins P.6 power unit and orthodox chassis units; tyre equipment is 8·25 × 15 14-ply. By offsetting the driver's cab to the right-hand side, operations are in full view of the driver. The driving position is conventional with excellent visibility for safety, and the accurate positioning of the machine relative to the aircraft.

The very low platform body is arranged to lift to a height of 12 ft and a roller conveyor and bridge facilitate the handling of loads of up to 5 tons of passenger baggage, freight or servicing equipment. A motor-driven power conveyor may be fitted if required. Loading or unloading may be carried out at the front, rear or right-hand side.

Scissor-type lifting mechanism is used, hydraulically elevated with fully automatic push button control from two control stations. At the desired height, hydraulically applied wedge brakes lock the platform and at the same time the mechanism is electrically and hydraulically interlocked to prevent misuse; in any event the mechanism will 'fail safe'.

Platform height can be precisely controlled and 'inched' into position. Hydraulic jacks are mounted at the front and rear of the chassis and ensure automatically the complete stability of the machine when elevated.

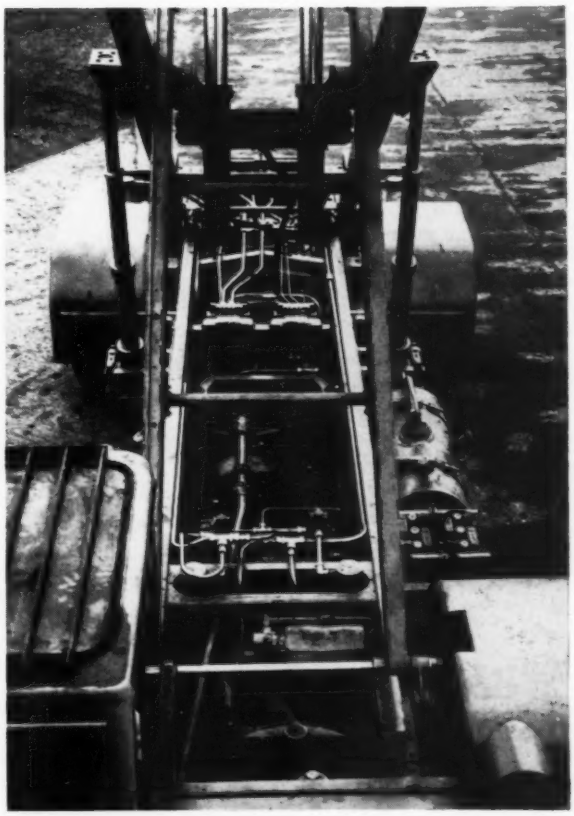


Fig. 2. This view from the front shows the massive construction of chassis and platform mechanism

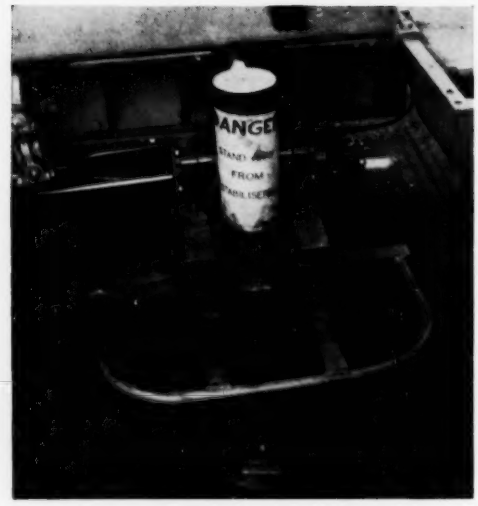


Fig. 3. One of the hydraulically operated stabilizers

Hydraulic pressure is supplied by Deri-sine pump driven from a p.t.o. on the vehicle gearbox. This supplies oil pressure to a maximum of 2,000 lb/sq. in. into the system. The hydraulic system is divided into two systems, one, the stabilizing and platform elevating equipment and the other the hydraulically operated mechanical locking device.

Stabilizer and Elevating Equipment

With the engine running and p.t.o. engaged pressure is fed via the pump to a solenoid operated 2-way valve. On the depression of the 'up' button the solenoid valve is moved to allow pressure to pass to the stabilizer rams through a sequence valve. When the stabilizers meet the ground and pressure builds up sufficiently to partially take the weight of the vehicle from the road springs the sequence valve diverts the oil to the platform lifting rams. The first movement of the platform operates a mechanical valve which isolates the stabilizer system. The push button is depressed for the whole of the operation and is only released when the required height is obtained.

To prevent cross flow of pressure between the stabilizer units each unit has a pilot operated check valve on the top side of the piston. These valves allow a free flow to lower the stabilizers and prevent any flow from the top side of the piston until the check valves are released by pilot pressure, operated when the stabilizers are selected to the 'up' position.

When the platform is required to be lowered the 'down' button is selected and held depressed until the full sequence of lowering is complete. The depression of the button operates the solenoid valve which allows oil to free flow from the platform rams.

The descent of the platform is determined entirely by gravity, the speed being a direct ratio of the weight carried by the platform. The oil being evacuated from the platform rams passes through the control valves; the size of the orifices in these valves bearing a direct relation to the speed of descent. When the platform reaches its lowest position the stabilizer system is unlocked and oil pressure from the main system is directed to the anulus side of the stabilizer pistons pulling them clear of the ground. When they are fully home a green light is illuminated on the control panel indicating that these are fully up.

Brake System

To provide a mechanical brake at any part of the scissor movement, hydraulically operated wedges are driven into the sliding roller-ways at the end of the scissor gear. These brakes can be operated at any time and are fully automatic in action if the engine is stopped or the p.t.o. disengaged. On depressing the brakes 'on' button a solenoid operated valve allows pressure to the brake ram forcing the wedge into position. This action is relay controlled and a pressure switch in the circuit disengages the solenoid when the brake is fully home, at the same time a red warning light is illuminated indicating that the brakes are 'on'. Depression of the brakes 'off' button similarly engages the solenoid

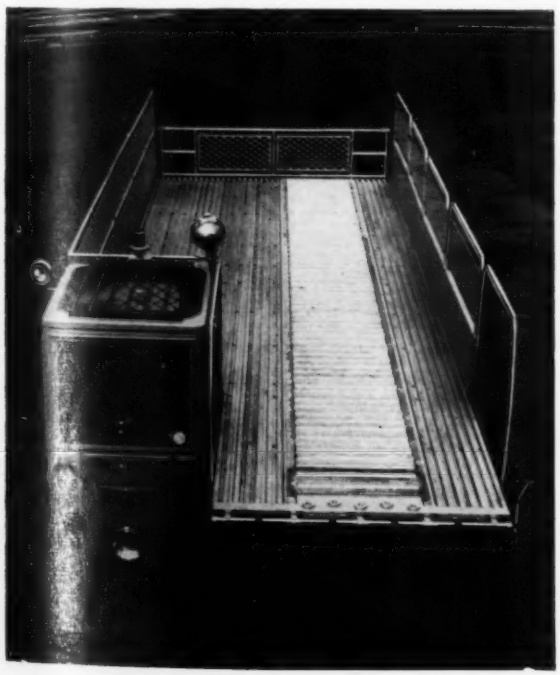
Fig. 4. Side view with platform in down position

Fig. 5. Platform fully elevated

operated valve allowing oil pressure to disengage the brake, and, as before, this is relay-operated with a pressure switch to centralize the solenoid when the brakes are fully 'off'.

A safety device is incorporated which includes a large hydraulic accumulator which will apply the brake system should a hydraulic failure occur in the system. It also applies the brake whenever the engine is stopped, or p.t.o. disengaged, or in the event of an electrical failure.

Fig. 6. View of platform showing roller conveyor



The accumulator circuit is controlled by a pilot operated 'on/off' valve the operation being determined when the pressure in the main system drops below a predetermined figure. This releases oil to the 'on' side of the brake cylinders and at the same time a solenoid operated valve is disengaged allowing oil to free flow from the offside of the cylinder. The red brake warning light is connected to the pressure switch controlling the brakes 'on' sequence and will show red whether the brakes are energized by the pump system or the accumulator system.

The platform elevating system has been designed on the fail/safe principles, that is, should a flexible pipe fail in the lifting gear the gear will descend at the same controlled speed as it does in its normal operation. Should the platform require stopping the immediate action is to press the brakes 'on' button which will hold the platform in its desired position.

Normal Operating Sequence

When an operating station is selected and brake 'on' warning light is illuminated, the brakes 'off' button must first be depressed before any platform lifting operation is commenced. To raise the platform the 'up' button is depressed and kept depressed until the height required is obtained. This action lowers the stabilizer jacks first, and then elevates the platform.

With the platform at the desired height the brakes can be applied either by pressing the brakes 'on' button or if the engine is stopped they will automatically be applied. After loading or unloading is complete, for lowering platform the brakes 'off' button must be applied and platform lowered. The platform 'down' button must be held depressed in the full lowering operation until stabilizers are clear of the ground and green light showing. Before moving vehicle p.t.o. must be disengaged which will extinguish a red p.t.o. warning light after which the vehicle can be moved.

NEW 'UNIVERSAL' DIGGER LOADER

THE latest addition to the Merton range of loading shovels and allied equipment is the Merton Sherman 'Universal', combining the hydraulic Frontloader 59 and the Sherman Panther Power Digger.

The outstanding advantage of the Merton Sherman 'Universal' is the way in which the digger, when not in use, is carried in a folded position, almost within the overall length of the standard Frontloader 59. It is a compact and well-balanced unit, only 17 ft long in the 'loading shovel' or 'carry' position, with a performance, manœuvrability and stability which is unaffected by the additional equipment it carries.

This arrangement has been largely made possible by the design of the Frontloader 59 itself which is designed for maximum operator comfort and efficiency. In addition to 'semi-automatic' hydraulic controls which take over routine operations and speed the loading cycle, the front-mounted driver's cab gives the operator an excellent unobstructed view of the bucket and of the ground in front. It provides, at the back of the machine, the space which Mertons have now used for the mounting and stowage of the Sherman digger.

Because it is claimed that the presence of the digger makes virtually no difference to the dimensions or stability of the shovel it need never be dismounted, even when the loading shovel is required for arduous work in confined spaces. The machine can change functions as often as required and it takes only 2½ min to lower or raise the digger and be ready for work in either guise.

The raising and lowering of the digger is a one-man operation. By means of a remote control lever on the outside of the machine the loader booms are raised; two tie-bars (carried alongside) are inserted between the digger and the main loader rams and the 'travel' locking pins are removed:

The Merton Sherman 'Universal' arrives on site in the travel position with the digger neatly retracted

the loader booms are lowered and the digger pivots down into its working position; the locking pins are replaced in the 'working' position, the hydraulic by-pass lever is flicked over and the digger is ready for work. By reversing the operation the digger can be stowed away equally easily; and it is so securely bedded down in the travel position that it causes no 'bumping' or 'swing', even over uneven ground.

The Sherman Panther is a robust and fast power digger. The hydraulic stabilizers are individually controlled, allowing the machine to be set up level on sloping or uneven ground and thus giving maximum stability and a vertical trench. Hydraulic cylinders are well protected from damage, and the cable chain swing drive, which gives an uninterrupted 188 deg arc of swing, is protected and regulated by a combination flow control and cushioning valve.

The operating pressure of 2,000 lb/sq. in. and the special multiple operating control valve give the Sherman digger a fast operating cycle of 15 to 19 sec. Output is between 25 to 75 cu. yd./hr depending on bucket size and site conditions.

The Frontloader 59 is powered by a Fordson Major 4-cylinder diesel rated at 54 b.h.p. at 1,800 r.p.m. A 13-in Borg & Beck extra heavy duty dry plate clutch is fitted and a constant mesh gearbox giving six forward (2 to 12·5 m.p.h.) and two reverse speeds.

Buckets are available from $\frac{3}{4}$ to 2 cu. yd. capacity to suit material; there are also rock buckets, bull- and angle-dozer blades, fork lift and crane attachments.

Maximum 'loadover' height is 12 ft 9 in; clear discharge height under tipped bucket 10 ft 8 in; maximum reach, 4 ft 10 in at 6 ft discharge height; reach at maximum discharge, 2 ft; discharge angle at maximum height, 43 deg and crowd angle at ground level, 45 deg.

For the Sherman Power Digger buckets are available from 12 to 60 in widths, capacities from 2 to $7\frac{1}{4}$ cu. ft.

The operator has connected the digger to the shovel linkage and is lowering it into position—note remote control at the side of the machine

Depth of dig is 12 ft; reach, 18 ft 1 in rearward or 11 ft 4 in at 90 deg to machine, measured from side of rear tyre; bucket clearance height, 9 ft 2 in; clear discharge height, 8 ft 8 in; uninterrupted arc of swing, 188 deg; overall length, 17 ft; overall height travel position, 10 ft 8 in; overall width travel position, 6 ft 6 in; overall weight 6 ton 5 cwt or 6 ton 15 cwt with ballasted rear tyres.

Two and a half minutes after arrival—changed from a manœuvrable front-end shovel into a powerful digger

5½-MILE-LONG BELT CONVEYOR SYSTEM

By Richard J. Salter, B.Sc.(Eng.), A.M.I.C.E., A.M.I.Mun.E.

An elevated section of the conveyor rising to clear railway tracks. The lightweight concrete construction and the aluminium wind shield can be seen

THE longest permanent cross-country belt conveyor system in the world was recently put in operation in southern Oklahoma. The series of seven conveyors, stretching for 5½ miles across the Oklahoma countryside, carries 1,000 tons/hr to the Ideal Cement Company's new plant at Ada, Okla., from the company's quarry.

The conveyor system provides a permanent transportation system that starts at the touch of a single push-button and will operate throughout the year, with lower operating costs than any other form of transportation.

This system of belt conveyors, designed, built and erected by Link-Belt Company has many unusual aspects:

One of the seven flights is claimed as the longest individual belt conveyor ever built. This belt conveyor measures 11,766 ft—almost 2¼ miles. Travelling at the rate of 500 ft/min, its 4½-mile belt makes only 10 round trips in an 8-hr day.

This is said to be the first major conveyor system ever supported by prestressed concrete structures. Light-weight concrete channels support the conveyor and provide a cover for the belt over the entire length.

The conveyor roadbed generally follows the terrain, with low places filled and high places crowned to give a smooth, rolling grade. Provision is made at six points for passage of cattle and farm equipment over the system.

The entire system is on a right-of-way strip averaging 150 ft in width, fenced on both sides. This right-of-way contains a 40-ft earth roadbed with its drainage structures, an electrical power transmission line from mill to quarry, the belt conveyor structures and a 16-ft stone-surface road.

Push-Button System

A single push-button in the cement mill control room puts the entire 5½-mile system in operation. The belts are started automatically in sequence, beginning with the last belt. Each belt starts when the preceding one reaches approximately half speed, for minimum start-up time.

To unload the system, this cycle is reversed, with each successive belt stopping in progression toward the mill end. In the event of power failure or any stopping of the system while it is fully loaded, each belt in sequence has been engineered to coast for a successively longer distance, to prevent any pile-up of material at the transfers.

Numerous protective devices stop the system in an emergency and flash a signal to the operator in the control room. These include metal detectors, head and tail drift switches, belt slip switches and take-up overtravel switches. The motors have overload relays and under-voltage relays, and the eddy-current clutches have temperature relays. All safety devices show as lights on the control panel, and the system cannot operate unless all circuits are closed.

The conveyor system operates eight hours a day, five days a week. It carries crushed limestone four days a week and shale on one day. The limestone is crushed to ⅜ in size in a crushing plant at the quarry end of the system. The shale is crushed to 6 in size in the primary crusher, bypasses the screens and secondary crushers and proceeds directly over the conveyor system. Since it takes nearly an hour for material to travel the 5½ miles to the cement plant, the system is designed so that it can be stopped at night fully loaded.

At the cement plant, shale is deposited by stacker into a soaking basin, while limestone is carried into the plant by an inclined belt conveyor and distributed to one of six storage silos.

When Ideal Cement Company decided to build a new plant alongside its existing plant at Ada, Okla., an economic study was made to determine the best method for transporting raw material to the plant from the Lawrence quarry, which contained an estimated 90 years' supply of limestone and shale. Principal considerations were reliability of service, low operating costs and reasonable capital investment and write-off period.

The study revealed that the belt conveyor would provide the most economical, reliable and efficient method of transportation. Though higher in first cost, it would prove

Snaking across country the conveyor takes maximum advantage of ground conditions

less expensive over a period of years than any other type of haulage.

Cross-country Journey

In order to take advantage of the most favourable terrain, the long-distance conveyor system was divided into seven flights, the shortest of which is 550 ft long and the longest 11,766 ft long. It changes direction six times. Grades average 6 per cent, with the steepest about 14 per cent.

All of the belts in the transport system are 36 in wide and run at approximately 550 ft/min.

The control panel of the conveyor system

The take-ups involved considerable thought—arranging the sheaves, pulleys and sliding carriages to accommodate the belt elongation that occurs under various conditions of loading and starting.

In a radical departure from steel-supported conveyors, the belt conveyor system is supported by precast, prestressed concrete channel stringers spanning 50 ft. In addition to supporting the conveyor, the stringers form a cover over the belt. One side of the conveyor is curtained by a continuous corrugated aluminium wind guard.

The concrete channels are placed flange-down and supported by precast, concrete U-stands which are attached to field-poured concrete footings. Carrying and return idlers are suspended from the channels with galvanized steel hangers.

Where the conveyor is raised to clear highways or railroad tracks, the U-stands are mounted on the top flanges of pairs of prestressed concrete girders. The wide top flanges serve as walkways.

The girders follow as closely as possible the vertical curves of the belt. They are supported on poured-in-place bridge-type piers of reinforced concrete, varying in height and utilizing round concrete columns supported on reinforced concrete spread footings.

In the entire final conveyor, which is elevated to cross the main line of the Frisco railway the concrete stringers are carried on a series of 97-ft post-tensioned, prestressed concrete girders which rest on four-legged concrete towers about 25 ft high. These towers consist of four round columns braced by three layers of horizontal struts. Each tower rests on a single spread footing.

All structures were designed to withstand winds of 100 m.p.h.

BREWING, BOTTLING AND ALLIED TRADES' EXHIBITION

Empire and National Hall, Olympia, Monday, October 3rd, to Friday, October 7th, 1960

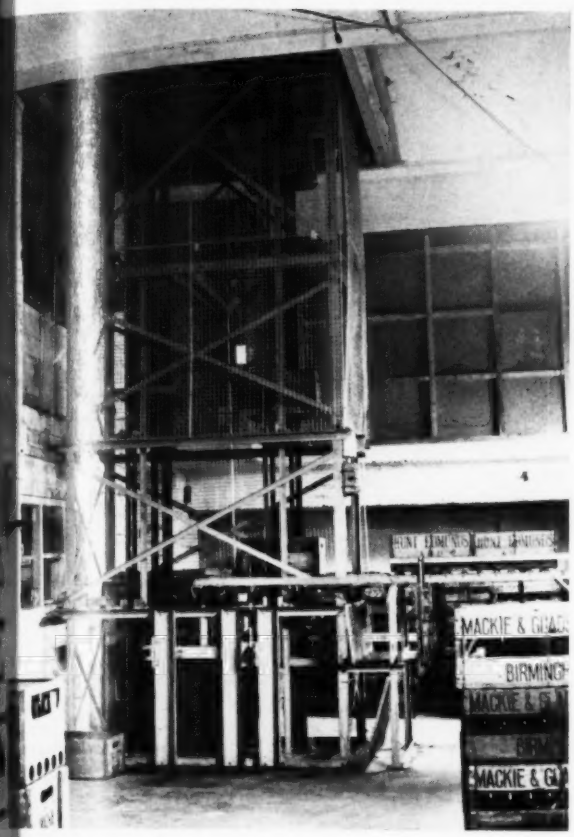
THE FOLLOWING are very brief details of a few of the exhibitors' products at the above exhibition:

A working pneumatic conveying exhibit with electrical weighing and central control will be shown on the stand of Thomas Robinson & Son, Ltd., Rochdale (Stand No. 5, Row L). Other exhibits on this stand will be the mobile malt turner, and a display of components in the Pneu-Spout gravity conveying system.

'Palletless handling' and the 'truck for the small users' will be a feature of Conveyancer Fork Trucks, Ltd., Warrington, stand. The palletless handling will be illustrated by a *new* Skid-stac attachment which handles unit loads of bags, boxes, crates or cases on a thin sheet of fibre board in place of pallets. The small truck for the smaller user will be a Conveyancer RE 2-24 electric reach truck. This truck has a capacity of 2,000 lb at 24-in load centres.

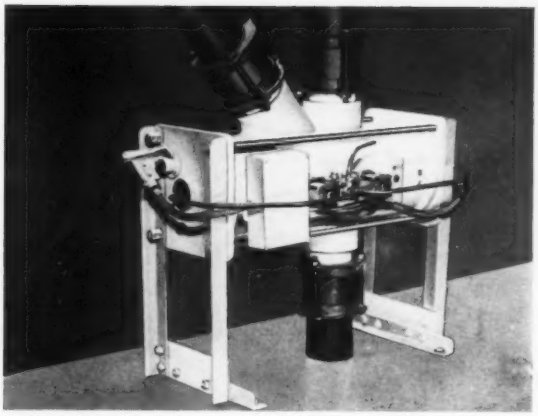
On the stand of Hugh Campbell (London), Ltd., a vertical case elevator working in conjunction with a double power chain and gravity roller conveyor circuit will be exhibited.

The pallet loader to be exhibited by W. & C. Pantin, Ltd.



Vertical case elevator with automatic infeed and discharge supplied by Hugh Campbell (London), Ltd., to Hunt Edmunds, Ltd., Banbury

Automatic rotary bottle lowerer supplied by Hugh Campbell (London), Ltd., to Cheltenham & Hereford brewery



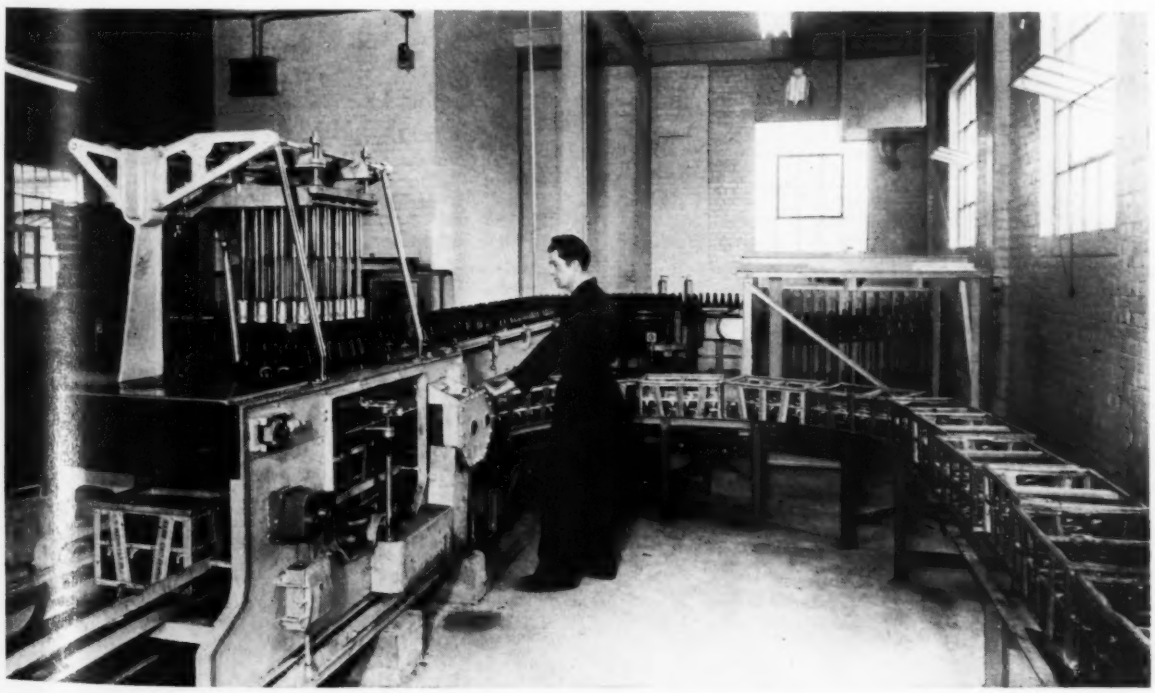
A double-solenoid electro-pneumatic blow-line diverter fitted with limit switches. The simple and rigid method of installation is clearly illustrated. Thomas Robinson & Son, Ltd.

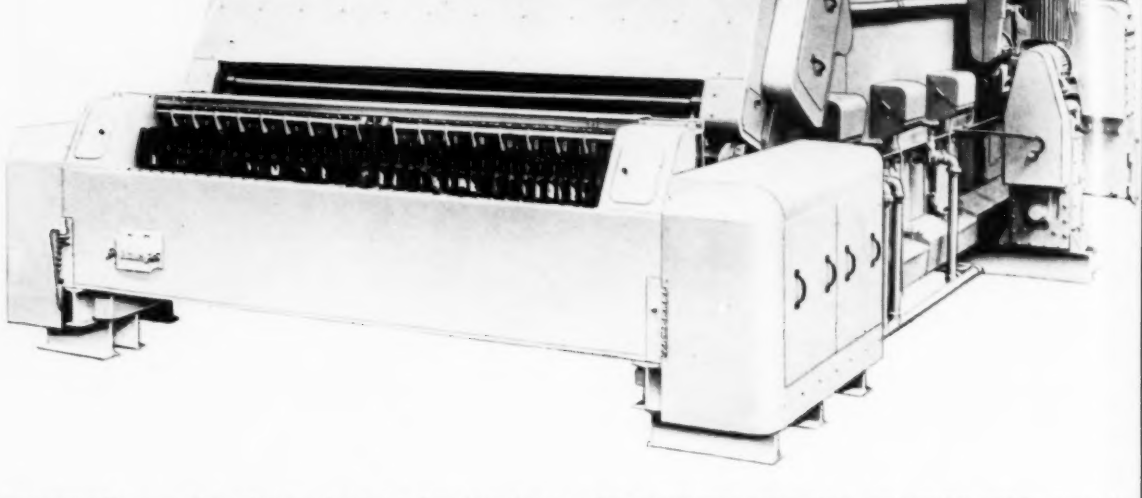
together with a patent rotary spiral bottling lowerer and the firm's well-known 'cellar to bar' bottle or can elevator, specially recommended for use in licensed houses.

On the stand of Mono Pumps, Ltd. (Stand No. 21, Inner Row, First Floor, National Hall Gallery), pumps with high suction power and ability to handle yeast and foam for the recent yeast skimming and recovery technique will be shown.

Dawson Bros., Ltd., on their stand, will exhibit a 36-bottles-wide, four soak tank, continuous soaker for handling up to 2,000 dozen half-pint bottles/hr. It will be fitted with a fully automatic magazine loader and during the exhibition bottle conveyor loading from the discharge to the loader will enable the machine to be in continuous operation.

The principal feature on the stand of W. & C. Pantin, Ltd., will be their semi-automatic pallet loader for the stacking of crates on to pallets; brewery cases will be fed on to the pallet loader by a belt elevator and arranged in a suitable pattern by the operator of the machine. They will be loaded

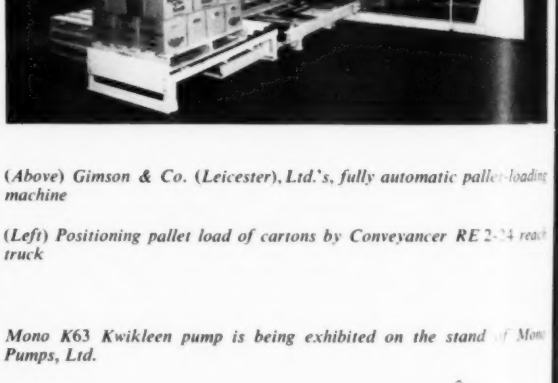




Dawson continuous soaker Hydro bottle-washing machine viewed from automatic magazine loader end

automatically on to the pallet, the loaded pallets then being discharged to one side of the machine.

Gimson & Co. (Leicester), Ltd., are exhibiting their fully automatic pallet-loading machine for cases, cartons, boxes and containers, etc. This machine automatically accepts containers from a low- or high-level conveyor, and forms the containers into a layer which is transferred on to the pallet. Other exhibits by Gimson are their fully automatic elevator for casks and drums, etc., their fully automatic lowerer and a stopper de-ringing machine.



(Above) Gimson & Co. (Leicester), Ltd.'s, fully automatic pallet-loading machine

(Left) Positioning pallet load of cartons by Conveyancer RE 2-24 reach truck

Mono K63 Kwikleen pump is being exhibited on the stand of Mono Pumps, Ltd.

NEWS OF PERSONALITIES

J. H. Vine, Head of the Modernization Section in the office of the Commercial Officer, Western Region, Paddington, has retired, having completed 45 years' service with the Great Western and British Railways. Mr. Vine was directly concerned with the mechanization at Bristol Temple Meads Goods Shed and the use in the Western Region of heavy-duty fork lift trucks. More recently he has been closely associated with experiments made with electronically controlled driverless trucks, a pilot scheme for which is shortly to be introduced at Wolverhampton (Herbert Street) Goods Depot.

Samuel Fox & Co., Ltd., a subsidiary of The United Steel Companies, Ltd., announce that **G. Thickett,** who has been combining his duties as works manager with those of billet mill manager, will relinquish the latter appointment to **E. Hampshire,** at present production controller. **N. P. Bromley** is appointed production controller.

H. M. **Henderson,** at present managing director of Unisteel Structural (Pty.), Ltd., of Cape Town, has been appointed director and general manager of the Workington Iron & Steel Company branch of the United Steel Companies, Ltd. Mr. Henderson takes up his new appointment in November, 1960. **T. Sanderson,** at present director and general works manager of Workington Iron & Steel Company, has been appointed deputy general manager. **H. Darnell,** at present chief engineer, will succeed Mr. Sanderson as general works manager.

Sutcliffe Engineering Industries, Ltd., announce the appointment of **H. Streets** to the board of Sutcliffe Plant Hire, Ltd., of Bond Street, Wakefield. Mr. Streets is also a director of Richard Sutcliffe, Ltd., Horbury.

P. Mc. A. Martin, general manager of the Sprotborough Foundry, John Fowler & Co. (Leeds), Ltd., has been appointed local director of the company.

Sir Willis Jackson, F.R.S., director of research and education of A. E. I. (Manchester), Ltd., is to return to academic life as Professor of Electrical Engineering at Imperial College, University of London. Sir Willis resigned his chair at Imperial College some seven years ago to become director of research and education of the Manchester company.

G. E. **Smith,** director of production for the Perkins Group, has accepted an appointment as assistant managing director of the Hamworthy Engineering Co., Ltd. **T. H. R. Perkins,** managing director of Perkins Engines Ltd., will act as director of production and will assume full responsibility from Mr. Smith on September 12th. This is a temporary appointment and J. M. Collins, export sales manager, will from this date become acting director of marketing for the Perkins Group.

L. A. **Lloyd** has been appointed spares and service manager of the Contractors' Plant Dept. (Southern Area) of Thos. W. Ward, Ltd., and will be based at Titan Works, Grays, Essex. As a result of this re-organization all enquiries for spare parts for Fowler Marshall tractors should be directed to that address. Tel. no.: Grays Thurrock 4806 and 4764.

Wolf Electric Tools, Ltd., announce the appointment of **Hans Mäder** as sales supervisor for Switzerland. Mr. Mäder, a fully qualified electronics engineer, has completed a period of works training and field experience with the Wolf organization in England and has now commenced operations in Switzerland and is working closely with the Wolf stockists and distributors there.

A major export drive by Lansing Bagnall, Ltd., is heralded by the appointment of **Dr. Karl Kobert,** former president of Switzerland, to be a director of the company's two Swiss subsidiaries—Lansing Bagnall Holding, Ltd., and Lansing Bagnall A.G. Dr. Kobert, who is 68, was educated at Switzerland's premier technical university—the Federal Institute of Technology in Zurich. He qualified as an engineer in 1914, and in 1917 gained his doctorate, the highest academic degree open to engineers in Switzerland.

Dr. K. Kobert

Hans Mäder

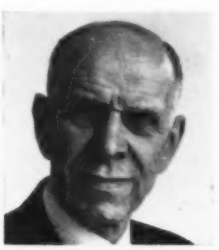
Wilfrid J. Fry, A.M.Brit.I.R.E., a director of Solartron Research & Development, Ltd., has been appointed sales director and commercial manager of Solartron-John Brown Automation, Ltd., London, W.2.

The Globe Pneumatic Engineering Co., Ltd., of Romford, Essex, announce the appointment of **D. J. Bickley, A.M.I.Mech.E.,** as technical sales manager of the company.

J. H. Taylor has been appointed general factory manager of Massey-Ferguson's Banner Lane tractor plant in Coventry. Prior to his present appointment, Mr. Taylor was facilities manager at Banner Lane.

William Colley Monckton Matterson, founder and joint managing director of Matterson, Ltd., has recently been awarded a degree of Master of Science at the Congregation for the Conferment of Honorary Degrees at the University of Leeds. Mr. Matterson, who recently celebrated his 75th birthday, was unable to complete his course at Leeds University, which he entered in 1904. The original ideas inspired by him and incorporated in many of the company's products, including hoists, cranes, gearboxes and machine

D. J. Bickley



W. C. M. Matterson

tools, led to his presentation for conferment of the degree by **Professor D. C. Johnson,** Professor of Mechanical Engineering at Leeds University.

Dewrance & Co., Ltd., announce that **D. Handley, B.Sc.,** has been appointed technical director at head office, also **M. T. Cunningham, B.Sc.,** has been appointed chief engineer in place of J. H. Gibson, who remains on the board.

British Insulated Callender's Cables, Ltd., announce the appointment of **P. M. Hollingsworth, M.Eng., M.I.E.E., M.A.M.I.E.E.,** as assistant chief engineer. Mr. Hollingsworth was formerly chief engineer of the Power Cables Division and, in his latest appointment, in addition to his principal duties as assistant chief engineer of the company, he will remain available to assist the Power Cables Division in the handling of special technical power cable matters.

Perkins Engines, Ltd., has set up a parts merchandizing branch within its service department. Manager of the new branch is **G. H. Yarnold,** formerly export service manager. Mr. Yarnold will be responsible to the general service manager for the world-wide parts merchandizing operations of Perkins Engines, Ltd., and will operate through the present sales and service outlets.

S. H. Oliver has been appointed manager of the purchasing department of Castrol, Ltd., in succession to the late A. J. Stafford.

The Engineering Group of The General Electric Co., Ltd., announces that it has reorganized its representation at the company's branches in Great Britain under five area chief engineers. This has been done in order that the four areas in England and Wales shall conform more closely to those of the Central Electricity Generating Board's Generating Divisions and Area Boards. The territories covered by the South of Scotland Electricity Board and the North of Scotland Hydro-electric Board will remain the responsibility of the Scottish Area chief engineer. The area chief engineers and the areas they cover are as follows:

E. W. Molesworth for London, Eastern and Southern England; **J. R. Mercer** for Scotland; **V. F. Ellison** for Yorkshire and the North East; **O. S. Chalmers** for North Western and North Wales; and **W. R. Greves** for Midlands and South Wales.

Five new appointments have recently been made by Atlas Copco (Great Britain), Ltd. **A. Hayes** is now the company's chief sales engineer for mining products in Great Britain; **W. T. Jones** is the newly appointed manager of Atlas Copco's mining division; **R. Marshall,** until recently a technical representative in Scotland for Eimco Loaders, now occupies a similar position with Atlas Copco, for the whole of Great Britain; **Ralph Noren** has been appointed manager for stationary compressor sales; and **T. M. Horn,** who was, until his retirement at the end of 1959, manager of the company's Leeds branch, is maintaining his contact in an advisory capacity.

OBITUARY

The death has occurred suddenly of **A. E. Diggens,** divisional sales manager of Nife Batteries, Worcs. Mr. Diggens, who was responsible for the Traction Batteries Division, had been with Nife for over 30 years.

BOOK REVIEWS

INDUSTRIAL PACKAGING. By Walter F. Friedman and Jerome J. Kipnels. Published by John Wiley & Sons, New York, and obtainable in this country from Chapman & Hall, Ltd., 37 Essex Street, London, W.C.2. 536 pages. Price 92s.

Containing a thorough and up-to-date survey of packaging materials, methods and equipment, this book will prove a valuable aid to manufacturers facing the problem of adequate product protection at minimum container and transportation cost.

While case histories are cited, the primary emphasis is placed on fundamental principles and many new and original techniques and analyses are presented. Included are a comprehensive Bibliography and Index.

DICTIONARY OF MECHANICAL ENGINEERING TERMS. Originally compiled by J. G. Horner, A.M.I.M.E. Eighth Edition revised and enlarged by Staton Abbey, A.M.I.M.I. Published by The Technical Press, Ltd., 1 Justice Walk, Chelsea, London, S.W.3. 417 pages. Price 27s. 6d.

When the late J. G. Horner compiled the original edition of this work, he aimed at producing a comprehensive dictionary of the traditional terms used by draughtsmen, pattern-makers, moulders, smiths, boiler-makers, fitters, turners, erectors and engineering storekeepers. The result turned out to be much more than that, and in its latest edition the Dictionary could be described as a condensed encyclopaedia of mechanical engineering practice, covering approximately 8,000 terms. It is difficult to know where to draw a dividing line between terms associated primarily with mechanical engineering and those which would be more appropriately found in dictionaries devoted to other branches of science and technology, and in the present edition an attempt has been made to strike a reasonable balance.

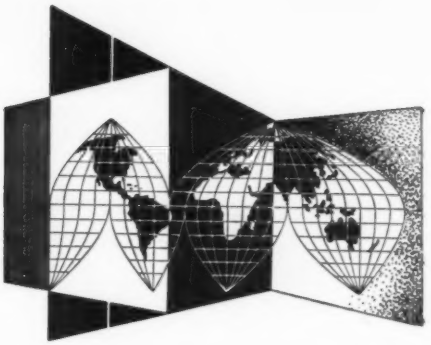
The Dictionary now contains two parts, the original work, thoroughly revised, being preceded by a 'Dictionary of Modern Terms used in Mechanical Engineering' which lists and defines a large number of terms which have come into use during recent years, such as the latest developments in automation and computers, and the growing use of electronics in inspection, testing and the control of machine tools, the relatively new science of ultrasonics and other advances which reflect the constant progress in engineering to-day.

ELECTRICAL WHO'S WHO 1960-61. Sixth Edition. Compiled by *Electrical Review.* Published on July 29th, 1960, by Electrical Review Publications, Ltd., and distributed by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 55s. net. Size 9 in × 6 in. 566 pages. Cloth bound.

The 'Electrical Who's Who' was introduced in 1950 and has become the recognised guide to prominent people in the electrical profession and industry. The 1960-61 edition contains about 9,000 entries, covering men and women in all branches of the electrical industry—supply, manufacturing, contracting, consulting, research, transport, mining and trade associations. Electrical engineers in the Post Office, the Admiralty, the Ministry of Supply and other Government Departments are also included.

The directory will be found useful not only by people within the electrical industry but, perhaps more so, by those in other spheres who have dealings with the industry.

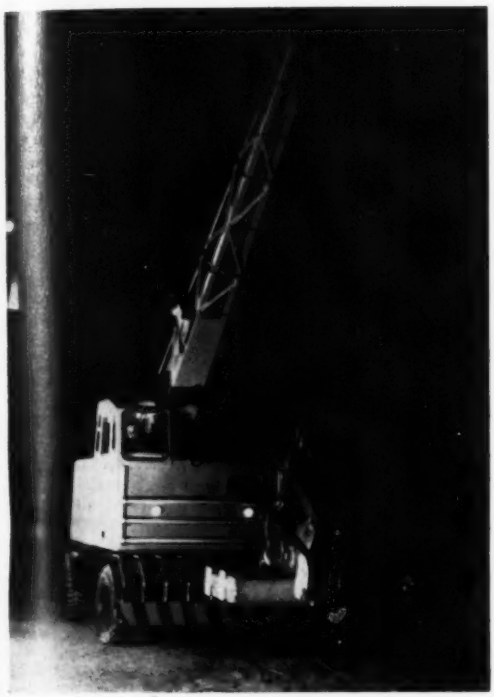
BRITISH MECHANICAL HANDLING EQUIPMENT OVERSEAS



British mechanical handling equipment is to be found working in most countries of the world. Each year since the end of the war, sales to overseas customers have increased. Buyers from overseas flock to the Mechanical Handling Exhibitions (organized by this journal) held every two years in London, so great is the regard for British-made equipment.

In this feature, to be continued each month, we shall bring you brief details and illustrations of such British equipment designed for, or at work in, countries abroad.

Overseas readers requiring information on any type of British mechanical handling equipment, or names of manufacturers' agents or representatives in a particular country, are invited to write to the Editor.



ABOVE:
GERMANY. *A Coles crane, model S1210, fitted with automatic tongs, handling red hot blooms in a German steelworks*

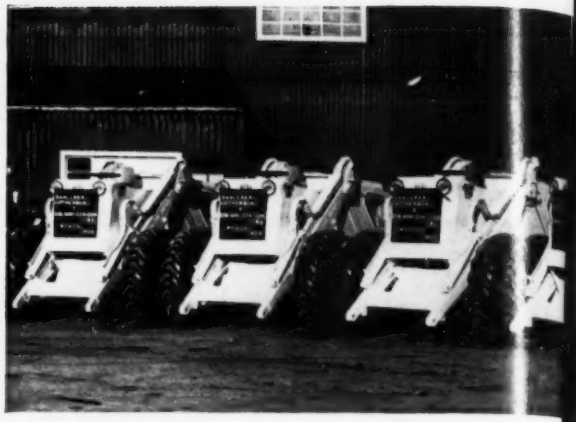
ABOVE, RIGHT:
AUSTRALIA. *The Countryman tractor manufactured by Chamberlain Industries Pty., Ltd., of Western Australia, which incorporates a 4-cylinder Meadows '330' diesel engine manufactured by Henry Meadows, Ltd., of Wolverhampton*

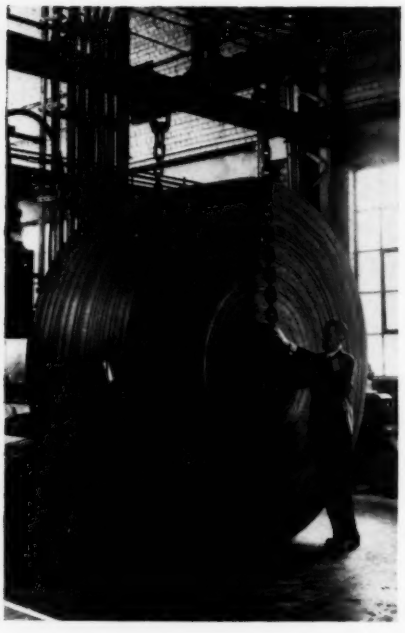
RIGHT:
SOUTH AFRICA. *A Ransomes fork lift truck at work at the Vacuum Oil Company's Depot in South Africa*

Le matériel britannique de manutention mécanique se trouve en service dans la plupart des pays du monde. Chaque année, depuis la fin de la guerre, le chiffre des ventes à la clientèle des pays d'outremer s'est accru. Des acheteurs venus de tous les pays du monde accourent aux Expositions de la Manutention Mécanique (organisées par notre publication), qui ont lieu tous les deux ans à Londres, si haute est l'estime que l'on a pour le matériel de fabrication anglaise.

Dans cet article, à suivre tous le mois, nous vous présenterons des détails succincts et des illustrations du matériel anglais spécialement étudié pour et mis en service dans les pays étrangers.

Nous invitons cordialement les lecteurs de l'étranger à écrire à notre Rédacteur en Chef (The Editor) pous tous renseignements concernant un type quelconque de matériel anglais de manutention mécanique, ou les noms de fabricants, agents distributeurs ou représentants dans un pays donné.





ABOVE:
SWEDEN. *Bray Construction Equipment, Ltd., have recently despatched the tractor shovels seen here to Sweden for use in quarries and highway construction works there. These have four-wheel drive, hub reduction axles, double acting hydraulics, power-assisted steering and four-wheel brakes. They are fitted with Perkins P6 80-b.h.p. diesel engines, torque converters and epicyclic gearboxes, and have a top road speed of 11 m.p.h.*

LEFT:
CHILE. *This 1,000-ft Goodyear HDNF conveyor belt, containing heavy-duty nylon fill fabric, is the biggest belt of this type built in the company's Industrial Products Plant at Wolverhampton. Together with another belt of the same size, it has been ordered by the Nitrate Corporation of Chile, Ltd., for the Cia. Salitrera Anglo-Lautaro's Nitrate of Soda producing plant at Pedro de Valdivia. This installation, in the crushing section, comprises part of a 1,500-ft conveyor system driven by a 250-h.p. motor at a speed of 510 ft/min*

En la mayoría de os países del mundo puede hallarse funcionando equipo británico de manejo mecánico. Desde que terminó la guerra la venta de tal equipo a los compradores de ultramar ha venido aumentando sin cesar. Tan considerables es la estima en que se el equipo de fabricacion britanica en todo el mundo, que son numerosísimos los compradores extranjeros que se personan en Londres para visitar la Exposición de Manejo Mecánico (organizada por esta Revista) que se celebra cada dos años.

En esta sección, que aparecará todos los meses, les ofreceremos ligeros detalle-e illustraciones de tal equipo británico diseñado para países extranjeros o funcionando en ellos.

Los lectores de ultramar que requiran información sobre cualquier equipo británico de manejo mecánico, o el nombre del agente o representante de los fabricantes en cualquier país en particular pueden escribir pidiéndola al Director de esta Revista.

Britische Förder- und Hebegeräte befinden sich in den meisten Ländern der Erde im Einsatz. Seit Kriegsende steigern sich die Verkaufsziffern an ausländische Abnehmer von Jahr zu Jahr. Ein so grosses Ansehen geniessen Geräte britischer Herstellung, dass ausländische Käufer anlässlich der alle zwei Jahre von dieser Zeitschrift in London veranstalteten förder- und hebetechnischen Ausstellungen in Strömen herbeikommen.

In dieser monatlich fortgesetzten Artikelserie werden wir kurzgefasste Einzelheiten und Abbildungen britischer Geräte bringen, welche für das Ausland konstruiert bzw. dort bereits im Einsatz sind.

Ausländische Leser, welche an Auskünften über britische Förder- und Hebegeräte gleichwelcher Art, bzw. an Namen and Adressen der entsprechenden Hersteller, Agenten und Vertreter in irgend einem gegebenen Lande interessiert sind, werden gebeten, sich schriftlich an die Redaktion zu wenden.

LEFT:
SUMATRA. *A Neal crane fitted with a Perkins P4(I) diesel engine and operated by B.P. Shell at Pladju, Sumatra*

REVIEW OF NEW EQUIPMENT

MIDGET CYLINDERS

A new range of ¾ in dia double-acting pneumatic cylinders has recently been introduced by Martonair, Ltd., Parkshot, Richmond, Surrey. Known as Type S.778, they are available in three stock lengths of

Standard range of Martonair double-acting pneumatic midget cylinders, made with three different lengths of stroke

stroke, 1 in, 2 in and 4 in. Construction is mainly non-ferrous, and double-ended versions are available. Each cylinder is fitted with a screwed nose and locknut for mounting and has two blind holes in the rear-end cover for trunnion pins or the fitting of a rear-hinge mounting. The ports are tapped ¼ in BSP and the piston rod is threaded ⅜ in B.S.F.

DUMPER FOR HYDRAULIC EXCAVATOR OPERATION

A robust medium-sized dumper to work in conjunction with modern tractor-mounted hydraulic excavators has been developed by C. H. Johnson (Machinery) Ltd., Adswood, Stockport. Of 2-cu. yd. heaped capacity, self-tipping and self-returning, with a very clean discharge, and of reinforced design, it is 7 ft 8 in wide and with a loading height of 3 ft 9 in for easy loading by power shovel or digger. Twin driving wheels can be fitted to negotiate soft ground. It is based on the Johnson Twin Sixty-Five dumper, its development being made possible by the extremely robust construction of the standard Johnson dumper chassis.

The double-reduction fully-floating drive axle has a 3½-ton loading capacity, and all wheel loadings are imposed on the axle casing and not on the half-shaft, giving ample reserve under all conditions. It can accommodate the 7·50 × 20 6-ply tyred single- or twin-driving wheels. Transmission is by direct propeller shaft, eliminating the use of chains, belts, etc. The robust chassis consists basically of quadruple rolled-steel channel members, giving rigidity, coupled with four-point anchorage to the drive axle casing, and very small axle overhang to reduce operating stresses. The power unit is the Petter AVA.2T air-cooled diesel with special deep sump, flywheel, complete dust proofing and many other features. It is stated that the dumper can do a fair shift's work on two gallons of fuel oil.

IMPROVED MIDGET HOIST

An improved version of the Haltrac midget hoist, described in the April 1959 issue of *Mechanical Handling*, has been introduced by the manufacturers, Haltrac, Ltd., Bourne Works, Weimar Street, London, S.W.15. This is fitted with an Autolock device that will hold a load suspended when the cord is released. The nylon cord passes between a solid nylon-toothed wheel and teeth on a pivoted nylon cam through the outer end of which it is threaded. When a load is pulled at an angle, the cord lifts the cam and thus runs free. If released, the cord is instantly held by the teeth closing on either side of it until a sideways pull frees the load again.

Compact in size, the hoist, made of specially tempered aluminium, weighs only 1½ lb, is rustproof and requires no lubrication. It is supplied with 72 ft of braided nylon cord which, passing over eight pulley wheels, gives an 8 : 1 reduction and a lift of 9 ft. Longer lengths of cord, giving lifts of up to 27 ft can be obtained. The equipment has been tested to a breaking strain of more than 1,000 lb on a straight lift, and can move a car, trailer or caravan weighing up to 2½ tons.

SYNTHETIC CONVEYOR ROLL BEARING

A new synthetic bearing for conveyor rolls which operates without lubrication or maintenance offers freedom from breakdown where such may occur due to lubricated roll bearings operating under

The new Haltrac midget hoist showing operating principle of the Autolock cord-gripping device

adverse conditions, as in dust-laden atmospheres, extremes of ambient temperatures, exposure to chemical reagents, spillage from solvents, etc. The Roll-Far moulded bearing is manufactured from polyester resin reinforced with fibre glass, and the makers, E. Farrell & Son, Ltd., West End Engineering Works, Chadwick Street, Oldham, have facilities for the conversion of existing rolls or supplying rolls complete with these bearings.

The new bearing can be accommodated in any type of roll, drawn, welded or spun steel, aluminium, etc., regardless of bore, by a patented process ensuring positive housing. It is practically noiseless, and the weight of a pair of bearings is approximately only two-thirds of the weight of traditional bearings. During tests over five months, even under conditions of rough usage, including the impact from a 2-cwt bogie dropped several times, bear-

A Johnson 2-cu. yd. dumper being filled by a J.C.B. Loadall excavator

ings have shown no sign of wear or fracture. The cost of conversion by the re-ending of existing rolls is approximately one-third less than that of replacement, and rolls with these bearings can be installed by unskilled labour.

HIGH-SPEED VIBRATORY SCREEN

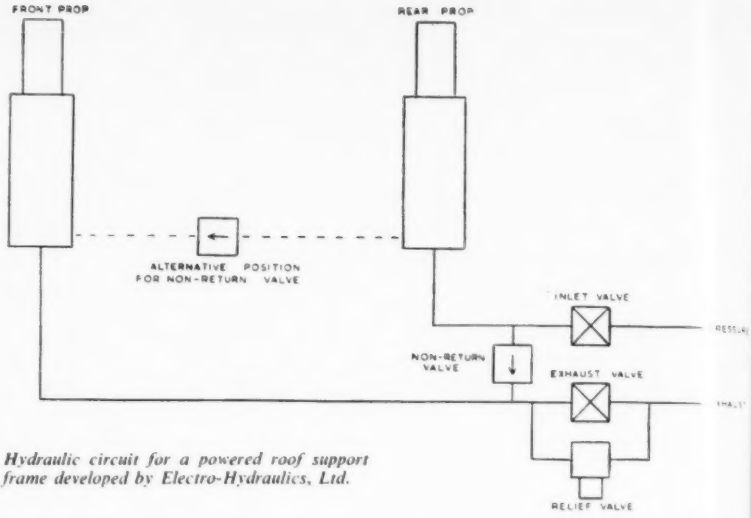
A new development in high-speed vibratory screen design is announced by W. J. Jenkins & Co., Ltd., Retford, Notts., who are now manufacturing their Viking screens with a completely new driving unit. On these screens, which are to be known as the Viking-Grantham, the drive and vibrator are incorporated into the motor which renders obsolete the conventional out-of-balance shaft with heavy bearings and rope drive. In addition to simplifying the design, there is a considerable saving in the horse power required, and a wide range of adjustment to the amplitude of vibration is easily obtained by a simple operation, giving a maximum in excess of that obtained by normal methods. With these advantages and the angle of deck adjustable from 50 to 30 deg, these screens are suitable for a wide range of materials and duties.

Single- and double-deck models are at present available in two sizes: the Viking-Grantham Minor, with a tray 4 ft long and 2 ft 7 in wide, and the Viking-Grantham Major, with a 5 ft long tray 3 ft 7 in wide.

POWERED ROOF SUPPORTS

Advancing roof supports usually comprise support frames, each having at least two props, a floor bar and a roof bar. A common source of hydraulic power is used for setting and advancing a number of support frames. A breakaway of the roof above the rearmost prop in a frame is a possibility because the roof is caved immediately behind the frame. If there are, for example, two props in a frame and a breakaway occurs, the props being hydraulically interconnected, roof-supporting pressure in both props will be lost and the roof fall may become more general, leading to possible injury to personnel, damage to equipment and loss of productive time.

Electro-Hydraulics, Ltd., Liverpool Road, Warrington, have overcome this problem in a simple, economic manner with the illustrated hydraulic circuit for a support frame with front and rear props. The hydraulic power supply is led to an inlet valve for setting both props. The pressure fluid passes direct to the rear prop and through a non-return valve to the front prop. A pipe line from the front prop leads to an exhaust valve for releasing both props. A pressure relief valve fitted in parallel with the exhaust valve allows yielding of the props under excessive load.



Hydraulic circuit for a powered roof support frame developed by Electro-Hydraulics, Ltd.

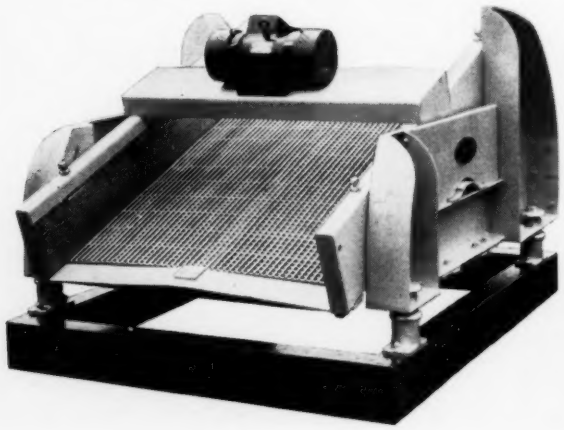
When the frame has been set to support the roof, both inlet and exhaust valves are closed. If the roof above the rear prop breaks away, pressure in this prop is lost. The non-return valve prevents consequent loss of pressure in the front prop. It is most unlikely that a breakaway will occur over the front prop, causing loss of pressure in it, as the roof bar extends in front of and behind it. Such a breakaway would almost certainly occur also over the rear prop. Consequently, it is not necessary to provide against a transfer of fluid from the rear prop to the front one. For each additional prop in a frame this system requires the addition of one non-return valve. If desired, the one inlet valve and one exhaust valve can control the setting of two or more frames. In this case the inlet valve admits oil under pressure direct to the rear prop of each frame, and the oil to the front prop of each frame passes through the single non-return valve.

ELECTRONIC LEVEL INDICATOR

After nine months' evaluation trials the new Levolog continuous level indicator is in full production by Thomas Industrial Automation, Ltd., Station Buildings, Altrincham. It has been designed for the continuous measurement of almost any material in silos, tanks, hoppers and other industrial containers, and, like its predecessor, the Leveltron industrial level controller, is capitance operated. It can be operated by any employee without any knowledge of electronics.

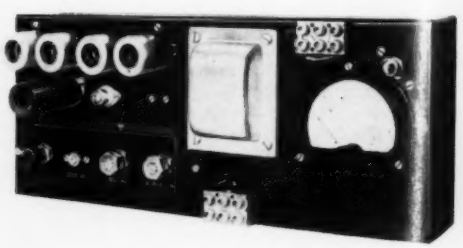
The control unit is used in conjunction with an electrode system fitted into the container, and incremental change of capitance caused by the level of the material rising or falling is used to operate an indicating instrument calibrated in gallons, tons or other applicable unit of measurement. The control unit houses the electronic equipment and a stabilized power unit which ensures stable working under varying mains conditions. A calibration meter is visible at all times through a window in the lid of the case. The electrode system can be of the rigid variety for

(Continued on page 691)



A single-deck Viking-Grantham high-speed vibratory screen

A Levolog electronic continuous level indicator chassis with lid removed



small vessels and flexible when the container depth exceeds 6 ft. The main indicating instrument, basically a D.C. milliammeter, is provided for local or remote indication.

The Levolog is housed in a specially-designed cast-iron case with lid fitted with a rubber gasket, making it dust- and weatherproof, and three ¾-in conduit entries on top and bottom. The built-in calibrating instrument, with scale length of 2½ in, can also be used as a local direct-reading indicator, and can be calibrated similarly to the main indicator. By the use of specially-designed electrode systems and electrode positioning, good accuracies and near linear scales can be achieved. The equipment can be supplied for use on all standard mains and voltages.

BASEMENT CONVEYOR

The V.M.E. basement conveyor has been developed as a standard item for use in numerous warehouses and storerooms situated below pavement or road level. The economic and efficient carrying of basement goods to and from trucks at road level has always been a problem to organizations requiring an inexpensive method of dealing rapidly with parked vehicles.

The new conveyor is mounted solidly on the basement floor with an inclined boom, the discharge end of which is situated at the street level opening. At the base a horizontal feed section provides an easy feed or discharge to operators at lower level, or alternatively to a gravity roller conveyor taking goods to specified positions. The belt is of the Grip-face type, allowing maximum angle of inclination with its consequent saving in space required. The machine is powered by an electric motor suitable for the loads to be handled and arranged to drive in both directions so that goods can be loaded and unloaded. V.M.E. Conveyor & Furnace Co., Ltd., Achilles House, Whitchurch Lane, Edgware, Middlesex.

SELF-DUMPING HOPPER

As a means of reducing the costs of handling wet, dry, hot or cold materials the new semi-automatic self-dumping hopper produced by T. B. Pearson & Sons (Engineers), Ltd., Walker, Newcastle-upon-Tyne, 6, is made in four sizes of ½, 1, 1½ and 2 cu. yd. capacities. Designed to fit securely on fork lift, platform and jack tongue industrial trucks, it operates at any required height when a safety catch is released. It then tips forward, empties its contents and automatically returns to the loading and carrying position where it locks itself ready for the next load. Stop-dogs prevent it from tipping too far, and a lug engages under the truck to prevent the bucket from slipping.

Strongly constructed, with welded joints, to withstand rough handling and heavy loads, the hopper can be equipped with live skids or castors with malleable, rubber-tyred or plastic wheels. For special applications it can be supplied in stainless steel, aluminium, metalized with various metals, galvanized or rubber-coated.

SWIVELLING TWIN WHEEL BRACKET

A new product of Autoset (Production), Ltd., Stour Street, Birmingham 18, is a twin 10 × 14-in solid-tyred swivelling wheel bracket. It incorporates double-tapered roller-bearing races, and can be locked in a number of positions by the insertion of a tommy-bar in holes located in a circular plate attached to the fork. Unlike a castor, it has no offset or trail and must necessarily be controlled by means of a handle or connected under Ackerman steering with another having similar characteristics. Malleable castings are used throughout with high-tensile steel for the wheel and pivot spindles. The dynamic load capacity is 2 tons and the wheels are outboard-mounted on double-tapered roller bearings.

The Autoset twin solid-tyred swivelling wheel bracket

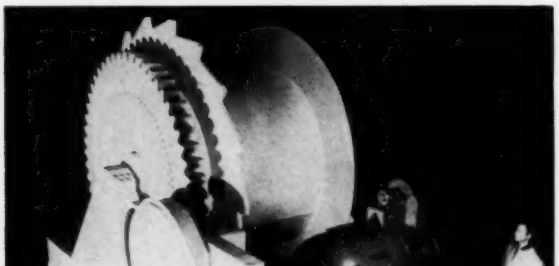
GIANT ELECTRIC WINCH

A single-drum electric winch, capable of developing more pull than that produced by four standard 1,200-h.p. railroad locomotives, has been designed and built by R. G. Le Tourneau, Inc., Longview, Texas, U.S.A. The first to be produced has been supplied to the U.S. Navy for an undisclosed application. It develops 300,000 lb line pull and is capable of holding 900,000 lb without slippage.

The overall dimensions of the new

A V.M.E. basement conveyor in operation

A Pearson self-dumping hopper discharging its load from a fork lift truck



Comparing the size of the giant Le Tourneau electric winch supplied to the U.S. Navy with that of a 6-ft man

A maximum tipping angle of 25 deg enables this 10-ton Blaw Knox bulk transporter to discharge readily either white or wholemeal flour. It is shown mounted on a B.M.C. articulated six-wheeler

winch are also out of the ordinary, as it is 10 ft wide, 17 ft long and 12 ft high. It has a 7-ft dia cable drum, which holds 3,000 ft of 2¾-in dia wire rope. Power is supplied by a 200-h.p. electric motor driving through an oil bath gear train which meshes with a 9-ft dia final drive gear bolted to the cable drum. For maximum safety while holding a load, the winch is equipped with a ratchet wheel and a manually operated ratchet pawl which, when engaged, eliminates any possibility of free spooling with a load. Normal operating safety is assured by an automatic solenoid-operated brake on the motor shaft. The brake releases when the motor is energized through the control switch, and engages when the switch is opened or in the event of an electrical power failure.

BULK FLOUR TRANSPORTER

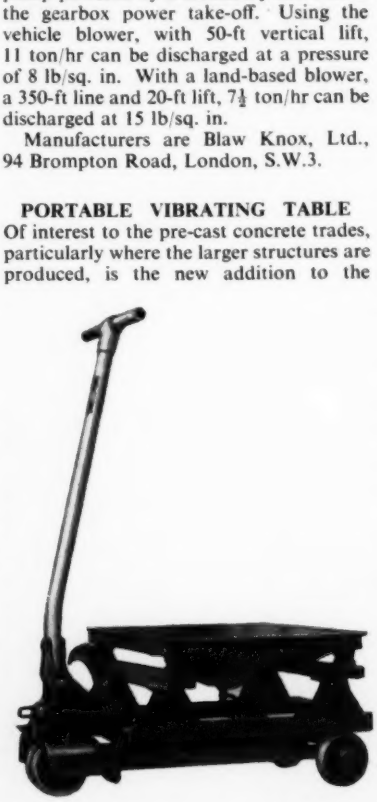
The new Blaw Knox bulk flour transporter comprises an end-tipped steel container, stiffened externally to give a smooth interior surface free from obstructions, and fitted with an airslide of woven synthetic fibre which is non-absorbent and immune from infestation, and three filling hatches in the roof fitted with weather-proof covers, easily accessible by ladder and walkway. The full-length airslide in the base fluidizes the flour, causing it to flow to the rear and discharge into a rotary blowing valve driven by a 125-c.c. single-cylinder petrol engine through worm gearbox and V-belt or a 1-h.p. geared electric motor. Either white or wholemeal flour can thus be discharged to storage horizontally, vertically or a combination of both through a 3-in or 4-in flexible pipe-line.

The blower unit is a Rootes-type oil-free unit, of 400 cu. ft. of free air/min capacity, mounted behind the driving cab and driven from the vehicle gearbox. If desired, discharge can be by means of an independent blower at the point of delivery and by by-passing the blower unit. The container can be tipped to provide a maximum angle of 25 deg to the airslide to facilitate discharge. Tipping is controlled by twin hydraulic rams and pump powered by a secondary drive from the gearbox power take-off. Using the vehicle blower, with 50-ft vertical lift, 11 ton/hr can be discharged at a pressure of 8 lb/sq. in. With a land-based blower, a 350-ft line and 20-ft lift, 7½ ton/hr can be discharged at 15 lb/sq. in.

Manufacturers are Blaw Knox, Ltd., 94 Brompton Road, London, S.W.3.

PORTABLE VIBRATING TABLE

Of interest to the pre-cast concrete trades, particularly where the larger structures are produced, is the new addition to the



The new Blencut Vibra-Lifta vibrating table mounted on a portable trolley equipped with hoisting mechanism

Blencut range of vibrating tables known as the Vibra-Lifta. Made in two sizes, measuring 2 × 2 ft and 3 × 3 ft, with loading capacities of 1,250 lb and 1 ton respectively, the equipment comprises a vibrating table fitted to a portable trolley having built-in hoisting mechanism. Free movement of the table enables one or two units to do the work of many, reducing time and labour and increasing productivity per operator. Each table is complete with a transformer unit, allowing the vibrator to operate safely on 110 V, 3-phase, 50-cycle A.C. current with 50 ft of T.R.S. 4-core cable and on-off switch. Optional extra spring cable reels are available to prevent troubles experienced with 'flying' leads.

To consolidate a concrete mix in accordance with modern techniques, the Vibra-Lifta tables will operate in pairs, one at each end of the mould, supporting its weight during the vibrational period. The frequency of vibration is approximately 3,000 v.p.m., derived from Blencut totally enclosed rotary electric vibrators beneath each table.

The manufacturers are the Blending Machine Co., Ltd., Bond Street, Hockley, Birmingham.

SILICONE GREASE

An addition to the silicone products of the Nobel Division of Imperial Chemical Industries, Ltd., Stevenston, Ayrshire, is a new silicone grease known as M 494, and said to have exceptional efficiency as a sealing agent for electrical equipment and as a general agent to protect surfaces against moisture. Its varied applications include protection of insulations from corona discharge, sealing and potting grease in electronic equipment, lubricant for electric cable prior to its being drawn through conduits, harness, etc., release agent in moulding and casting operations, packing grease for glands and for impregnating asbestos packings to prevent sticking of joints, glass stop-cock lubricant, lubricant for preventing sticking of screw threads, e.g. with electric fittings located outdoors, and a vacuum sealing grease.

TRADE NOTES

Baker Perkins Acquire Granbull Tool Co.
Baker Perkins, Ltd., Peterborough, have acquired the Granbull Tool Co., Ltd., Kingston-on-Thames, Surrey. The company has been associated technically and commercially with Baker Perkins, Ltd., for some time, particularly in connection with the Autoblow unit—a Baker Perkins extruder coupled to a Granbull bottle blower which can produce 960 4-oz plastic bottles an hour. The Granbull Tool Co. also manufacture moulds and equipment for the plastics industry and press tools, jigs and fixtures for industry generally.

Sutcliffe Plant Hire, Ltd.
Richard Sutcliffe, Ltd., manufacturers of mechanical handling equipment, of Horbury, announce the formation of a subsidiary company, Sutcliffe Plant Hire, Ltd., the object of which is to provide a hire or hire purchase service for conveying and associated ancillary equipment.

Experience has shown that many potential users are deterred from the purchase of new plant either because it will be required for a limited period or because capital outlay is prevented by other commitments. The new company offers a hire service ranging from single conveyors to complete installations as well as for equipment such as hydraulic drives and electronic control gear which are manufactured by other companies within the Sutcliffe group.

Blackpool Corporation have purchased a concrete batching and mixing plant to supply ready-mixed concrete to council projects. The plant, which will produce 180 yd of ready-mixed concrete a day, was made by Frederick Parker, Ltd., of Leicester

Service engineers are available throughout the country to advise and assist in the operation of hired plant, and the company offers an initial advisory service on the type and layout of equipment. Their offices are at 14a Bond Street, Wakefield. Tel: Wakefield 6433.

Production Record at IH
Over 10,000 BTD-6 crawler tractors have now been made at the Doncaster works of International Harvester Co. of Great Britain, Ltd. The 10,000th machine, complete with Drott skid shovel, is to be shipped to Australia, one of the company's best customers, where it will be featured at the Brisbane exhibition in August. The BTD-6 crawler tractor was first produced at Doncaster in 1954. Since then, often with matched equipment including the Drott skid shovel, Bullgrader blade or scraper, it has been shipped to 57 countries over the world.

Reorganization of BSA Power Unit Division
An entirely new organization has been created by the BSA company to handle its agricultural and industrial engine business. Manufacture of the BSA range of power units has for some time been carried out at the company's Redditch factory, with the design and sales departments operating from Birmingham. The whole organiza-

One of the machines exhibited by Mackay Industrial Equipment, Ltd., Feltham, Middlesex, at the demonstration of the Institute of Public Cleansing is the Allis-Chalmers new HD.6G tractor-shovel with ripper, now available in this country. Powered by a 79·5-h.p. four-cycle diesel engine, the HD.6G produces a 16,670 lb drawbar pull at 57 drawbar horsepower. Four forward speeds from 1·5 to 5·5 m.p.h. and two reverse speeds of 2·0 and 4·1 m.p.h. can be selected from the single lever located within easy reach of the operator. Dumping height of this new machine is over 9 ft to the cutting edge of the bucket. The curved bottom bucket tips back 40 deg at ground level, with a 21,500 lb breakout force at the cutting edge

BELOW:
Mr. Acreman, Trade and Publicity Officer from the London office of the Queensland Government (right), talks with Mr. F. Zmarzly, Works Manager of International Harvester at their Doncaster plant on the occasion of the production of the 10,000th BTD-6 Crawler Tractor to be made in Great Britain

tion is now centred at Redditch, where self-contained premises will be devoted entirely to the design, manufacture and marketing of these engines. The address is: The Birmingham Small Arms Co., Ltd., Power Unit Division, Studley Road, Redditch, Worcs. The manager of the new plant is H. V. Gray and the sales manager G. R. Turner.

Ford's Achievements in the U.S.A. Tractor Market

Tractor Division, Ford Motor Co., Ltd., whose tractors were on show at the British Exhibition in New York, announce that of 12,951 British tractors exported to the U.S.A. in the year ending March 31st, 1960, 7,712 were Fordsons manufactured at Dagenham. With a 60 per cent share of the market for British tractors, Fords of Dagenham became one of the world's largest exporters of tractors to the U.S.A. for this period, during which American farmers, Dagenham's biggest overseas buyers of Fordson tractors, took 11 per cent of total production of 70,620 tractors and 20·4 per cent more in the first two months of 1960 than in the same period of 1959.

New Departure in Weighing Equipment

Precision Engineering Co. (Reading), Ltd., makers of Waymaster scales and weighing equipment, have now entered the field of electronic and hydraulic weighing machines. They have undertaken schemes for hydraulic weighing with electrical 'take off' equipment, conveyor weighing, rolling stock wheel and axle load recording, and flow meters.

They have recently completed an overseas contract for electronic weighing equipment in conjunction with conveyor delivery, incorporating a check weighing arrangement for overweight and underweight items, and a punched card record of weighing. The company intends to prepare designs and manufacture special equipment in these and other categories.

New Subsidiary in Australia for Alfred Bullows

Alfred Bullows & Sons, Ltd., Long Street, Walsall, Staffs., announce that they have established a subsidiary company in Australia, known as Alfred Bullows & Sons (Aust.) Pty., Ltd., Ethel Avenue, Brookvale, Sydney, N.S.W. This subsidiary company is able to offer the full range of Bullows equipment, and is under the management of W. J. Proffitt.

Goodyear Torture-test Conveyor Belts

Development of a rugged testing unit that submits conveyor belting to tensions far greater than any other testing facility in the industry has been announced by the Goodyear Tyre & Rubber Co., of Akron, Ohio, U.S.A. The new machine will be used to conduct endurance tests on full-scale belt samples under extreme tension and higher-than-normal speeds. As a result, Goodyear will be able to make a much more accurate evaluation of the life and performance of a belt under the most difficult conditions. The testing unit is built by Adamson United Company of Akron.

Exhibition at Fruit and Vegetable Market

The wholesale value of fruit, vegetables, and flowers produced in the United Kingdom each year is about £130 million. Naturally, it varies from year to year with the weather. The value of fruit, vegetables, and flowers imported is of the same order. To this we can add another £70-80 million a year of the potato crop in this country. This gives a grand total of about £350 million a year as the wholesale value of fruit, vegetables, and flowers traded in the United Kingdom.

Most of the enormous tonnage of produce that these figures represent passes through the wholesale markets of the country. Unfortunately, practically all the existing markets in the main cities were designed and built many years ago, when the total handlings and the range of produce were both much smaller than they are to-day. Consequently, most markets are congested and inconvenient for the speedy and safe handling of produce. The design of the markets and their congestion have limited the opportunities to introduce modern methods of handling goods, which are mostly still moved by hand or hand-loaded truck.

Plans for the radical improvement of some markets and complete rebuilding of others are under consideration in many large towns in this country. The wholesale fruit and vegetable market at Coventry is the only one to have been completed since the war. The city of Sheffield has a new and spacious market under construction and it is expected that it will be brought into use early in the new year.

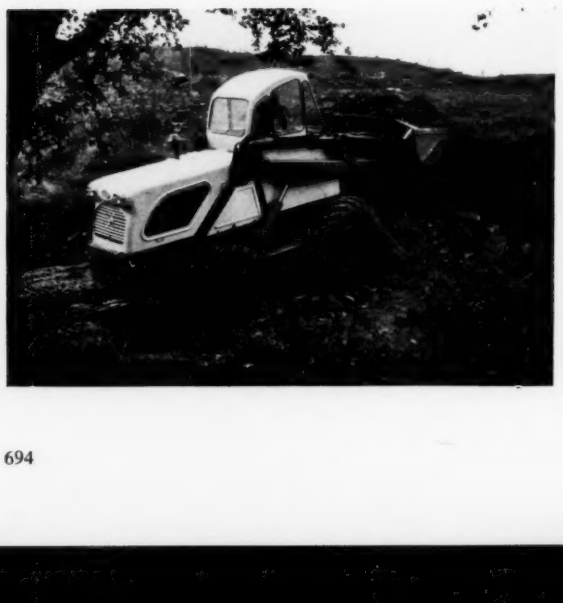
In view of the importance of ensuring that the best handling methods are used in Sheffield's new market, and as a demonstration to those interested elsewhere, the Horticultural Marketing Council and the Sheffield City Council are collaborating in an exhibition of mechanical handling equipment to be held on the new market site from October 18th-20th, 1960.

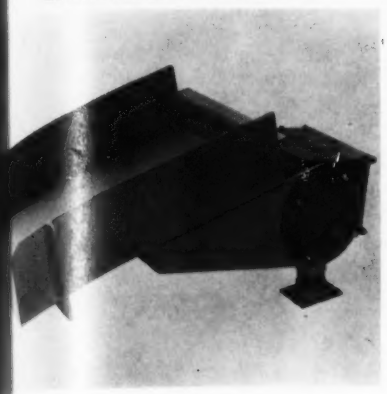
A considerable number of prominent manufacturers of equipment have already expressed great interest in this exhibition. It is hoped that the local result will be efficiency in the day-to-day operation of Sheffield's new market; but the exhibition

(*continued on page 695*)

RIGHT:
The H400A Hyster Challenger fork lift truck shown in the photograph is the first of its size and type to be sold outside the U.S.A., and it is capable of lifting 40,000 *lb* (*nearly* 18 *tons*) *to a height of* 23 *ft. It has been supplied by Levertons of Newcastle to Consett Iron Company for handling steel slabs in their new* 4*-high Plate Mill. Consett's new mill, which is scheduled to start rolling in the autumn, will be capable of turning out finished steel plates up to* 120 *in wide and* 90 *ft long and will have a capacity of* 10,000 *tons a week*

BELOW:
A Bray B.L. 450*T tractor shovel fitted with a Perkins L*4 (*I*) *diesel engine and operated by Steeley Dolmite* (*Quarries*), *Ltd.*





The Engineering Group of the General Electric Co., Ltd., showed two new developments in the Sherwen range of vibrating equipment at the national Concrete Products Exhibition, held in Stockholm in June. Shown here is one of the exhibits, the type QC Sherwen electromagnetic vibrating feeder in which the electrical and springing systems are totally enclosed

will serve, also, to demonstrate to those from other towns and cities what can be done in a properly designed market.

Mechanical handling is important to the horticulture industry not only because it is quick but, equally important, that by using such methods the produce should come through the market in better condition, having suffered fewer of the bumps and bangs inevitable with hand working.

Traveloader Demonstration at Lackenby

The Lackenby Universal Beam Mill, which cost upwards of £30 million, is said to be the largest in Europe and the most modern in the world, with a planned output of over 10,000 ton/week. Apart from universal beams, in which the company specializes, the works also produce billets, rods, bars and narrow strips.

As in every industry, a substantial proportion of the production cost of beams and other products is represented in the cost of handling, storage and transport, and it has recently become essential that a more flexible means for handling and storage beams be provided. After careful consideration and experiment Dorman Long (Steel), Ltd., decided to use Traveloader heavy-duty side-operating fork lift transporters, supplied by Materials Handling Equipment (Great Britain), Ltd. These transporters are now working on three 8-hr shifts, six days a week, handling parcels of beams up to 15 ton in weight.

The demonstration, which took place at Lackenby in May, showed the facility with which these machines, operated by one man, picked up heavy parcels of beams from the rollers, transported them at speed to the other end of the mill, and then either stacked them—up to 12 ft—or loaded them into rail wagons. To conclude the demonstration, and for the benefit of executives of British Railways and the Port of London Authority who were present, a Traveloader picked up from ground level a railway container approximately 24 ft long, 7 ft 4 in wide, and 8 ft high, weighing about 10 ton, and loaded it on to a British Road Services vehicle in a matter of minutes.

Jones Crane Photo Competition

A first prize of 250 guineas and eight additional prizes, bringing the total to 600 guineas, are being offered in a competition to find the best black-and-white picture of Jones cranes. Sponsored by George Cohen Sons & Co., Ltd., it is being run by their publicity department. Entries will be accepted from professional as well as amateur photographers. Closing date is December 31st, 1960. Further details and rules for the competition are available upon application from the manager, Group Publicity Dept., The George Cohen 600 Group, Ltd., Wood Lane, London, W.12.

Orion Computer Order

The Prudential Assurance Co., Ltd., has placed an order with Ferranti, Ltd., for an Orion data processing system. This installation, with the necessary associated punched card equipment, involves a total cost of some £400,000. It is intended that this equipment shall be installed at the chief office in London.

New Exhibition at Crystal Palace

After an interval of 25 years the Crystal Palace is again to become the site of a major international exhibition. In June, 1961, a new exhibition, the Construction Equipment Exhibition, will be launched on a 25-acre area at the Crystal Palace. A new company, Construction Equipment Exhibitions, Ltd., has been formed to sponsor and promote the project. Overseas manufacturers of construction equipment will be invited to take part in the exhibition and display their products alongside those of their British competitors, and the object of the exhibition will be to present the most comprehensive display of equipment for the building and civil engineering industries ever assembled on one site.

Induction Furnace Agreement

An agreement signed between The General Electric Co., Ltd., and the British-Geco Engineering Co., Ltd., covers the design, manufacture and sale of induction furnaces such that the resources and expert knowledge of the two companies in all matters relating to induction heating are combined. Enquiries for induction heating plant covered by the agreement, and requests for information, should be addressed to the Furnace Department, The General Electric Co., Ltd., Erith, Kent.

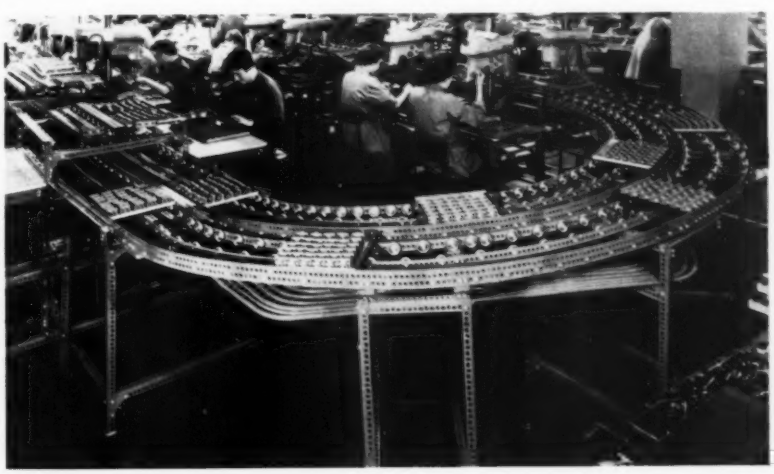
New Factory for Aveling-Barford, Ltd.

Aveling-Barford, Grantham, announce that they have awarded the contract for design and construction of their new factory premises on the Newburn Estate, Newcastle upon Tyne, to Taylor Woodrow Construction, Ltd. The factory will be engaged primarily upon steel fabrication and platework for all the U.K. companies of the Aveling-Barford Group, and will also be used to expand the manufacture of Goodwin Barsby Asphalt Plant.

Order for Clyde Crane & Booth, Ltd.

An order for 10 level-luffing cargo handling dockside cranes for Tees Dock, No. 1 Quay, has been received by the Mossend branch of Clyde Crane & Booth, Ltd., from the Tees Conservancy Commissioners. The cranes will be of the latest Clyde Hydral-Luff design which features a self-contained low-pressure electro-hydraulic system for operating the luffing motion.

When the A.E.I. Instrumentation Division at Motherwell developed a new Simmerstat for domestic cookers they used a production line of solid timber benches linked by heavy roller conveyors, the whole layout occupying an area roughly 40 ft square. Victor Friebe, the development engineer in charge, faced with the job of effecting a vast production increase quickly, designed a completely new assembly layout, incorporating a much-refined version of his earlier bench/conveyor/bench system. Under his guidance, the plan was interpreted by Dexion Contracts Division. Picture shows part of the 'Race Track' layout of the Glidewheel conveyor built by Dexion for A.E.I., to cope with the increased production



V.M.E. Conveyor & Furnace Co., Ltd., announce that in order to meet the ever-increasing demand upon their design services they are now installed in new premises at Achilles House, Whitchurch Lane, Edgware, Middlesex, where they have taken over the entire office accommodation of a newly erected building

PUBLICATIONS RECEIVED

Hydraulic Oils
The above is the title of a 74-page handbook just published by Wakefield-Dick Industrial Oils, Ltd., a member of the Castrol Group of Companies. It contains 50 illustrations, and includes chapters on fundamental hydraulic principles; hydraulic systems, pumps and components; and hydraulic fluids. Copies are available free of charge on request to Wakefield-Dick Industrial Oils, Ltd., Castrol House, Marylebone Road, London, N.W.1.

Goodyear Industrial Products News
The June, 1960, issue of this publication describes the latest developments and activities of The Goodyear Tyre & Rubber Co. (Great Britain), Ltd.

Strad Project
A brochure from Standard Telephones & Cables, Ltd., Oakleigh Road, New Southgate, London, N.11, describes the Strad high-speed automatic electronic re-transmission systems, which they claim to be the first operational fully electronic automatic telegraph re-transmission system of its kind in the world.

Ransomes & Rapier, Ltd.
These manufacturers, of Waterside Works, Ipswich, offer a new publication, fully illustrated, giving details of their high discharge truck mixers.

Strength and Wire Ropes
The new and revised 70-page catalogue of the Sheffield Wire Rope Co., Ltd., a member of the Firth Cleveland Group, lists the company's ropes in accordance with the revised standards issued by the British Standards Institution. Copies available on request from the Sheffield Wire Rope Co., Ltd., Darnall, Sheffield 9.

Prefabricated Buildings
The latest publication from J. E. Lesser & Sons, Ltd., Green Lane, Hounslow, Middlesex, describes the 'Middlesex' prefabricated buildings, which are particularly suited for overseas markets.

Noise in Factories
The Department of Scientific and Industrial Research have produced this 26-page booklet in their series of factory building studies. It is divided into two parts: the first explaining how noise is generated in industrial operations and its effect on people near; the second discussing the various ways of reducing noise in factories and their effectiveness.

Metal Chip Handling Systems
Metal chip handling systems for automatic, continuous crushing and de-oiling of metal chips and turnings are described in a new 12-page book 2926 just released by Link-Belt Company of Chicago, Illinois.

V-belt Journal
The June, 1960, number of the above publication details recent developments and company activities of J. H. Genner & Co., Ltd., of Hull.

Soag Machine Tools
A new, illustrated stock list which includes details of over 80 high-grade, selected second-hand machine tools is now available from the above company, of Juxon Street, London, S.E.11. The list covers planners, slotters, vertical and horizontal borers, millers, grinders, lathes, gear cutters, power presses, etc., all of which have been carefully overhauled or rebuilt and are available from stock.

'Silcoset' Silicone Rubbers
An illustrated booklet recently issued by I.C.I., Ltd., Templar House, 81-87 High Holborn, London, W.C.1, describes the various applications and properties of 'Silcoset' rubbers.

Elliott Automation
A booklet recently produced by this company covers a series of six talks broadcast in the External Service of the B.B.C. by Leon Bagrit, and is entitled 'the A.B.C. of Electronic Brains'.

Conveyancer Fork Trucks, Ltd.
A set of leaflets which have just been brought out by the above firm include lifting tables, the E6-24/67-24, the Shortland 21, T.C.67 series, and the T.C.6 series 3 Y.M., together with the English range supplement brochure.

The Nickel Bulletin
The June, 1960, issue gives abstracts of current published information on nickel and its alloys, obtainable from The Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1.

International Combustion Products, Ltd.
The most recent publications issued by these manufacturers include catalogues for the ty-rocket screen, rod decks for ty-rock vibrating screens and the dynocone solid bowl continuous centrifuge.

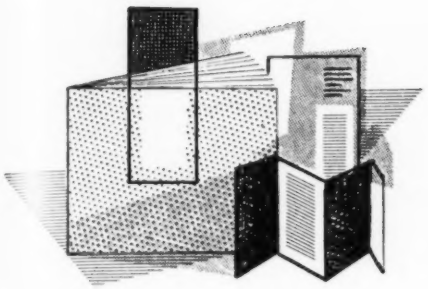
Lancashire Dynamo Electronic Products, Ltd.
The following new publications are announced by this company, of Rugeley, Staffs: automatic lighting control, transistorized level control, smoke alarm and densitometer and process timer.

Durgapur Steelworks
The second of the four stages of the construction of the great steelworks at Durgapur in West Bengal which has now been completed, has been summarized in a booklet issued by the Indian Steelworks Construction Company, Ltd.—ISCON.

Desoutter Bros., Ltd.
The current catalogue of the above company, of The Hyde, Hendon, London, N.W.9, introduces a number of new models which have recently been added to their range of small pneumatic tools.

Technical Books for Engineers
The Summer 1960 issue of Machinery's Technical Books for Engineers catalogue gives full details of their handbooks and reference books, obtainable from The Machinery Publishing Co., Ltd., National House, 21 West Street, Brighton 1, Sussex.

Overhead Runways Described
As a supplement to their main sliding door gear catalogue, Coburn Engineers, Ltd., have published a guide to overhead runways. This booklet illustrates gear available for runways, with some typical applications depicted, including installations in a factory, chemical works, brewery and a poultry farm. Booklet available from Coburn Engineers, Ltd., Coburn Works, Peasmarsh, Guildford, Surrey.



ABSTRACTS AND REFERENCES

Articles on mechanical handling published in all technical and industrial journals of the world are indexed and abstracted below. Whenever it is known, the published price of the journal containing the article is given.

The addresses of the publications concerned are given and applications for copies of the journals mentioned should be made direct.

SCREW ACTUATORS

Cheaper than Hydraulic Counterparts. *Mechanizatsia i Avtomatizatsia Proizvodstva.* Issue No. 3 pages 16, 17 and 18.

The screw actuators employed in the coal and other mines are considerably simpler and cheaper equipment than the hydraulic counterparts. The actuator is made of a cylindrical body with built-in motor as shown. The rotor is mounted on a hollow shaft which is provided with an internal thread. The rotation of the shaft causes an axial movement of the plunger (rod) which is prevented from turning by a key. The shaft revolves on needle bearings, permitting a side displacement of the rotor. On both sides of the latter limit switches are placed. They are acted upon by thrust bearings. A calibrated spring is interposed between the limit switch and the thrust bearing. The rotor exerts a continuous pressure on one of the switches, the effort being equal to the resistance encountered by the plunger. When the effort is exceeding the nominal value the plunger would stop and the rotor would continue to thread itself on the plunger. This would cause opening of the circuit by the limit switch. The screw actuators are being produced in four types a nominal effort of 165-1,323 lb (75-600 kg). The maximum strokes of the plunger are 5·9-15·75 m (150-400 mm). Power required 0·75 to 3·8 kW. The stroke can be varied from 0 to its maximum.

AUTOMATED CONVEYORIZED TRANSPORT IN THE OPEN MINES

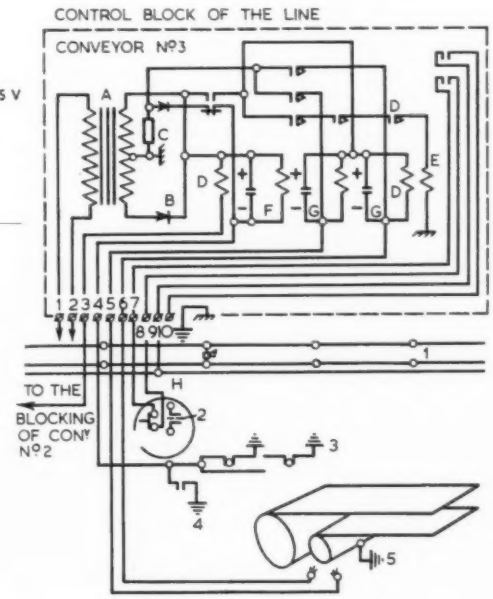
Moving Coal in the Urals. *Mechanizatsia i Avtomatizatsia Proizvodstva.* Issue No. 3, pp. 23, 24, 25, 26, 27 and 28.

The transport of coal in the Urals open mines is carried out by belt conveyors. Their average length is 0·6-1·2 miles (1-2 km) and the total of such lines reaches some times to 9·3 miles (15 km). The individual length of a single conveyor is 230 ft (70 m). Therefore, up to 30 controlling stations are required for each line. The automated control has reduced considerably the number of personnel which was supervising the operation. A simplified diagram of the automatic remote control is shown. The basic features of the control are as follows:

Automatic stop when there is a breakdown in the belt, side shift of the belt and overloading. This is controlled by inductive transducers type RUK-2. It consists of two series connected coils inside of which permanent magnets are placed. These transducers are installed below the supporting rollers. The induced electrical force is stepped up by a transistorized amplifier. The reliability of the operation is greatly influenced by perfect concentric running of the roller, because the clearance between the transducer and the roller determines the sensitivity of the instrument.

Automatic speed control is done by a relay with a tacho-generator. On some

Diagram of simplified version of automatic remote control

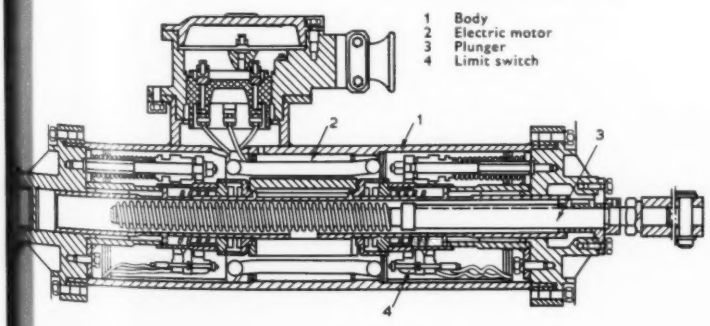


KEY

a Transformer 380/48/24 V, 20 Watts
b Selenium rectifier, four elements, 40 mm. dia
c Arc quenching resistance 150 Ohm, 2Wt
d Relay type RKN 24 V
e Relay type MKU/48 for 24 V. 2 poles
f C_1 electrolytic capacitor 400 mkf., 50 V
g C_2 and C_3 electrolytic capacitors 200 mkf., 5 V
h Magnetic starter

1 Circuit of audible signals
2 Blocking contact of the conveyor
3 Transducers for side shift of belt
4 Transducer for overload
5 Speed transducer

Screw actuator type PTV



1 Body
2 Electric motor
3 Plunger
4 Limit switch

of these installations the function of the latter was assured by a simple cycle dynamo. The control voltage for the whole installation was 36 V. As the power required for a long conveyorized line was quite big the problem of switching each section was solved in the following manner: In the early installations the conveyors were connected downwards, i.e. against the movement of the material being transported. This has proved to be an expensive wastage of energy by running idle many conveyors. In recent installations the order of connection was done in the reverse, and each section stopped automatically when empty. The control was achieved by placing two limit switches on each conveyor, mechanically linked with levers sensing the load on the belt.

The remote control of the line is obtained from a panel provided with two sets of instruments and contactors. The arrangement was made in order to switch over a unit proved to be faulty.

OVERHEAD PARTS DISTRIBUTION

Workpiece Distribution, *Automation*, Penton Building, Cleveland 13, Ohio, U.S.A. June, 1960. P. 108.

The distribution of 4,200 parts/hr to 10 different points is said to be possible by the overhead system described. A feature of the arrangement is a cushioned gravity feed that permits vertical feeding of parts without excessive acceleration. Each part rolls, rather than falls, and reverses its rotation at regular intervals, resulting in a gentle descent without damage. The parts are elevated from the storage bin to a vibrator orienting table and then loaded into all empty packets in a chain-type conveyor moving continuously at 8 ft/min. The conveyor also operates a notched reloading wheel at each machine being supplied. Each wheel has a single notch into which the part from every tenth pocket is transferred. The wheels rotate and parts are released on demand to machine loading chutes. When a chute is full, the wheel transfers a part out of the pocket but retains it until the chute can accept it.

GIANT MOBILE SALVAGE CRANE

A Mighty Lift, *The Australian Engineer*, 20 Loftus Street, Sydney, Australia. May, 1960. Pp. 78-79. 7s. 6d.

The revolutionary Le Tourneau electric wheel is a feature of seven huge mobile salvage cranes, the first of which, it is stated, was recently officially handed over to the R.A.A.F. by the Department of Supply. They are being partly fabricated and fully assembled by Australian National Industries.

The hub of each wheel contains its own electric motor, so that all transmission is reduced to an electric cable. In the event of bogging down or the need to hurdle immovable objects or to clear a path through dense timbered areas, the power from an immobilized wheel is automatically transferred to the other wheels, so that the maximum power generated continues to drive the vehicle forward. The crane weighs 50 tons and, with the boom lowered, is 80 ft long. Mounted on wheels 7 ft 5 in in dia, it is capable of speeds up to 30 m.p.h. It can lift and carry a Neptune bomber with ease and, despite its size, is extremely manœuvrable.

These cranes will be used to clear runways in cases of emergency. With their length of boom they can tear a burning section of an aircraft away from a fuselage on the chance of freeing a trapped crew and doze away burning wreckage.

FOR CONVEYOR BELT RELIABILITY

The New A-B-C Belt Idler, *The Austrian Machinery and Steel Construction Review*, Vienna I, Bauermarkt 13. May 1960. P.6.S18 (other countries)

In an article describing some of the productions of Binder & Co., Graz-Eggenberg, brief reference is made to the A-B-C conveyor belt idler, which uses the new Austrian Binder cushion system. This is said to possess the utmost simplicity of design, without failure-prone structural elements, complete maintenance freedom and shock-absorbing operation as particularly required for hard usage on building sites or in mining work.

The A-B-C system uses a bearing sealing of Perbunan rubber in place of the end shields of cast iron or stamped sheet steel. This centres the roller bearing and connects it with the body of the idler. The result is a positive connection between roller bearing and idler shield, while at the same time preserving necessary freedom of movement in the axial direction, precluding canting of the bearing, liable to result from faulty assembly or the effect of heating. The sealing problem has been solved by giving the bearing seating a shape which, in conjunction with continuous lubrication, provides a three-fold seal against the ingress of dirt and water.

SAVING STORAGE SPACE

Folding, Stacking Pallets, *Automatic Machinery*, 65 Broad Street, Rochester 14, N.Y., U.S.A. July 1960. P. 67. 60c.

New folding pallets described are designed to afford savings in space for storage and transportation. They are of all-steel welded construction, and available in standard sizes. Setting up or folding is accomplished without tools by raising or lowering the corner posts in keyhole slots on the baseplate. When folded, four pallets occupy the space of one set up for use.

FOR HANDLING MATERIALS

Sheet and Billet Lifter, *Blast Furnace and Steel Plant*, 624 Grant Building, Pittsburg 30, Pennsylvania, U.S.A. July 1960. P. 708. 50c.

For handling single sheets, slabs, billets or ingots, a new lifter described makes use of multiple vacuum cups or scissors tongs as required. Tong action is automatic, and the face of the material handled is protected by supporting rollers attached to the tong arms. The frame supporting the vaccum cups is actuated by air cylinders controlled by a solenoid valve, and the lifter incorporates its own vacuum system, including motor, pump and vacuum reservoir. A unit illustrated has a tong capacity of 8,000 lb and a vacuum lift capacity of 1,200 lb, both with adequate safety factors.

SIDE SHIFTER FORK TRUCK

Heavy-Duty Fork Truck Attachments, *Civil Engineering*, 33 West 39th Street, New York, N.Y., U.S.A. July 1960. P. 122, 50c.

A new side shifter and a combination side shifter-slope piler attachment are said to be now available for the Yardlift trucks. The former eliminates excessive fork truck manoeuvring by allowing the operator to centre the forks under the load and accurately set down loads in confined areas. It provides a maximum lift of 6 in on either side of the fork truck centre. The shifting carriage moves on a large tube and slide at the top and two bundle rollers at the bottom to minimize friction. The combination side shifter-slope piler consists of a similar side shifter and an hydraulic arrangement which pivots forks 5 deg about the centre line of the carriage. The ability of the operator to align the forks with a load which is not level is a desirable feature when handling heavy, bulky loads over rough or sloping terrain.

ACCIDENT PREVENTION

Safety in Materials Handling, by W. J. Byrne, *Mechanical Engineering*, 20th and Northampton Streets, Easton, Pa., U.S.A. July, 1960. Pp. 30-31. 75c.

In this article the author first states that the handling of materials is the principal single source of work accidents and injuries in American industry. Reliable records show that 25 per cent of all injuries stem from some form of materials handling. One of the major reasons why accident prevention efforts are limited is the tendency of business firms to place safety activities under Personnel and Industrial Relations rather than under methods engineering or production. After referring to process charts, layouts and individual operational studies, the author suggests a series of pertinent questions aimed at isolating potential injury-producing conditions, and expresses the opinion that as these and other questions are asked about every step in the materials handling process, safety deficiencies emerge, and no single handling category can fail to benefit from such a survey.

FOR HANDLING SHEETS

Overarm Sheet Feeder, *Plant Engineering*, 308 E. James Street, Barrington, Illinois, U.S.A. July 1960. Pp. 222-223.

A large-size overarm feeder for feeding sheets from pile to processing or conveying or conversely is said to handle a variety of materials, such as plastics, cardboard, metal and asbestos, in sheets ranging in size up to 6 ft × 20 ft. It grasps the sheets by means of vacuum cups supported on a carrier mounted between two oscillating arms, rotates the arms from one side of the machine to the other, lowers the carrier to engage a sheet on one side and transfers the carrier and load to the other side. It then releases the vacuum and deposits the sheet in piles up to 30 in high. The carrier automatically returns for another sheet unless the machine is set for single-cycle operation. It is hydraulically operated, handles rectangular, irregularly shaped, flat or corrugated sheets and can pick up or deliver them vertically or horizontally. Floor space required is slightly larger than the sheets handled.

UP AND DOWN STAIRS

Power Truck Moves Heavy Equipment Over Stairs, *Plant Engineering*, 308 E. James Street, Barrington, Illinois, U.S.A. June, 1960. Pp. 188-189.

A two-wheeled electrically-driven hand truck, named the Stair Cat, can it is said, move loads up to 500 lb in weight up or

(*Continued on page 69*)

down stairs at a rate of 18 ft/min. It is 5 ft long and 2 ft wide, and has a 40 ft length of electric cable for plugging into a mains supply. The operator has only to guide the truck, and automatic braking is provided so that with power cut off, or in the event of power failure, the truck will not move. After being loaded, it can be wheeled to stairs and positioned for automatic movement. A strap, automatically wound into a coil, has a steel ratchet device for tightening it around the load.

INDEPENDENT LIFTING MAGNET
Portable Lift Magnet Operates from Self-Contained Battery. *American Machinist*, 330 West 42nd Street, New York, 36, N.Y., U.S.A. June, 1960. P. 188. 75c.

Because of its self-contained power supply, a portable lifting magnet can, as stated, be used anywhere, independent of electrical power lines. With 400 lb lifting capacity, it is powered by a built-in replaceable dry-charge battery. In use, it is hung on the hook of a hoist or crane. The magnet has a built-in charger with a plug-in receptacle and control panel with on-off switch and charging indicator.

PROGRESS WITH FUEL CELLS
Fuel Cells—Almost Here. By Dick Dietz, *Materials Handling Engineering*, 812 Huron Road, Cleveland 15, Ohio, U.S.A. July, 1960. Pp. 50-53. 75c.

In reviewing the progress made with fuel cells, the author of this article first states that the question about fuel cells is not whether they will work, but when they will be ready for use. One authority is quoted as saying that they will be powering fork trucks in less than two years. The more conservative are said to predict military use of fuel cells in about three years and industrial use in five. Several early applications are illustrated and information is given on fuel cell construction, acting principle and advantages afforded. In conclusion, brief details of seven different types of cell are given.

VERSATILE TRENCH DIGGER
Lateral Shifting Trencher, *World Construction*, 22 West Maple Street, Chicago 10, Illinois, U.S.A. July 1960. P. 61. Annual subscription, $8.50.

With instant lateral positioning and tilting of its digging wheel, the new Cleveland JS-30 crawler trencher described can dig a trench behind either of its crawler tracks or at any point within its 6 ft width. Lateral shifting of the digging wheel enables the machine to dig the edge of a 24 in wide trench 5 in outside either track, permitting the trench to be dry flush with parallel pavement, kerbs and sidewalks. Hydraulic power tilting of the digging wheel 7 deg to either side of vertical enables the unit to dig vertical trenches or side slopes adjacent to kerbing, etc., without cribbing. The machine's crumbling shoe can be raised or lowered from the operator's seat. The shoe pivots up above the digging wheel, so that the latter can be set in for digging driveways and other obstructions without extra clearance for the shoe.

RECENT PATENTS

The following are brief extracts of recent United Kingdom patents which we believe will interest our readers. For full details the original patent specifications should be consulted at, or bought (3s. 6d. each) from, The Patents Office, Southampton Buildings, Chancery Lane, London, W.C.2.

HOIST CABLE
Demag Zug G.m.b.H., of the Ruhr—U.K. 825206.

A form of flat electric hoist cable, not very thick, but comprising two or more wires close together and set in resilient material.

BIN FILLING
Atkinson Bulk Transport Co., of Minneapolis—U.K. 825209.

Way of fluidized filling of any shaped bin completely and more especially of covered lorries or rail wagons, using a set of spaced tubular inlet pipes, somewhat in the fashion of water sprinkler arrangements.

LIFT TRUCK
Sigomatic A.G., of Zurich—U.K. 825213.

Transfer truck or dolly operated by compressed air, hydraulic or electric drive, for use in garage vehicle storage.

JIB CRANE
T. Fladmark, of Aalesund—U.K. 825218.

Form of luffing and slewing crane on turntable, giving simpler hydraulic power transmission, e.g. on ship.

SHIP'S DERRICK
Maskin A/S Ankerlokken, of Oslo—U.K. 825266.

Ship's hoist winch having two axially movable couplings on the topping drum, to avoid breaking the lock by unintentionally applying power.

SHOVEL
General Motors Corporation, of Detroit—U.K. 825331.

Mechanical handler with a bucket or scoop on a pivoted boom, under hydraulic control, with a coupling to avoid spillage by varying the scoop hanging position as it lifts.

BULLDOZER
Clark Equipment Co., of Michigan—U.K. 825357.

Tractor dozer with a variable blade tilt arrangement using a simple hydraulic operation on a U-shaped frame.

COOKER CONVEYOR
M. Beauvois, of Marrakesh—U.K. 825432.

Arrangement for steam cooking and hot air drying, successively, using a chain-driven articulated conveyor carrying trays which may be inverted for easy drainage.

STACKER
British Hoist & Crane Co., Ltd., of Berkshire—U.K. 825441.

A type of wheeled jib on road frame with hydraulic luffing.

LIFT TRUCK
Registered Projects, Ltd.—U.K. 825492.

A patent from Hamburg for masted lift truck carriage having a simple automatic flange gripping arrangement.

BELT CONVEYOR
Cable Belt, Ltd., of Inverness—U.K. 825483.

An arrangement of guide pulleys and pivots for deflecting and reversing cable direction, somewhat as per patent 711524.

OSCILLATING SIEVE
Klochner Humboldt Deutz A.G., of Cologne—U.K. 825504.

A design of partly submerged conveyor screen running into water, with given wedge-shape units to get maximum classification effect.

REMOTE HANDLING
U.K.A.E.A., London—U.K. 825552/3.

Hand-operated device for remote moving of objects, e.g. behind screening walls, using a given form of hand grip and holding jaw.

HEAVY LOADER
H. A. Rendel, of San Diego—U.K. 825554.

Type of lorry with movable rear frame for loading, etc., even when heavy camber to road, by lowering floor to road level, etc., by system of chain lifts.

LIFTING FORK
Matterson Huxley & Watson, Ltd., of Coventry—U.K. 825569.

For lifting oil or beer barrels, hay bales, etc., using a series of tines formed either from U-shaped bents bars held on a

frame, or V-shaped sets of slats.

SHACKLE
K. A. Kjolner, of the Isle of Man—U.K. 825575.

Design of quick-release shackle for use with buoys, having a spring action, operated by cable to open the claws.

REFUSE COLLECTION
Gar Wood Industries Inc., of Michigan—U.K. 825593.

Road vehicle design which allows continuous filling of rubbish to collector for compression and storage from tailgate. The compression panel rotates through 360 deg. but does not move through the hopper input position.

ENVELOPE MAKING
Lamson Paragon, Ltd., of Canning Town—U.K. 825610.

Conveyorized system for making bags and envelopes from folded web of paper or heat sealing plastic.

LABELLER
J. W. Flower & Co., Engineers, Ltd., of Dorset—U.K. 825621.

Rotary pickers extract labels from a magazine passing on to a labeller which wipes across the rotating container face, with a gumming stage, also.

HELICAL CHUTE
Farrow & Jackson, Ltd., of London—U.K. 825633.

Conveyor for tetrahedral packs such as milk, where the pack support rotates against a helical rail to feed down the cartons.

COAL CONVEYOR
Coal Industry Patents, Ltd., of London—U.K. 825651.

For working from the coal cutter to gate conveyors, comprising mounting on trolley trains, based on mono rails, each trolley having a trough and scraper chain.

CHALK DISINTEGRATOR
E. Andreas, of Munster—U.K. 825653.

Form of centrifugal impact breaker needing 30 per cent less power than usual, giving a very finely ground product, and using a given form of suspension impact plate.

CABLE HOIST
M.A.N., A.G., of Nurnberg—U.K. 825671.

For use with stripper cranes to lift cables under tension, for instance in foundries to handle ingot moulds. Sets of pulleys are used backed at the fixed end with a tension spring and associated with the hydraulic brake. The arrangement is compact and avoids ever having slack rope.

HYDRAULIC SHOVEL
Chaseside Engineering Co., Ltd., of Hertford—U.K. 825701.

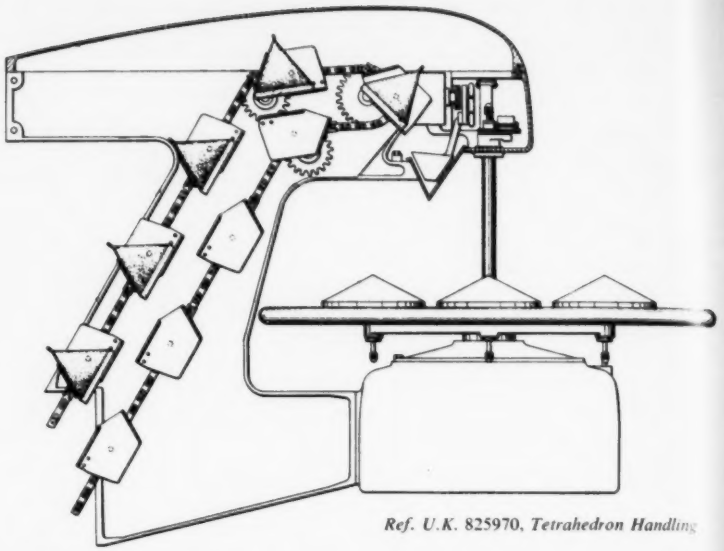
Outlines a form of mechanical scoop or shovel wherein the sudden jerks in action are prevented from giving rise to turbulence in the hydraulic fluid by a form of baffle.

LOAD SUPPORT
J. R. Sharp, of Basingstoke—U.K. 825702.

Fork truck arrangement with pivoted arms having load engaging members, e.g. for fitting into pallets, which can swing towards or away from each other.

BELT CLEANER
Simon Carves, Ltd., of Stockport—U.K. 825706.

A resilient flexible member is used to slide across the conveyor surface and clean it. It can also rock in its bearings.



Ref. U.K. 825970, *Tetrahedron Handling*

ROTARY TABLES
W. Canning & Co., Ltd., of Birmingham—U.K. 825722.

Intermittent drive for conveyors based on a Geneva escapement slide for the fluid pressure control.

STEAM WINDER
Gutehoffnungshutte Sterkrade A.G., of Oberhausen—U.K. 825747.

Load lowering arrangement under automatic control of braking valve, using pressure oil adjustment mechanism.

MOBILE CONVEYOR
H. E. Tomkins, of Raynes Park—U.K. 825769.

With fork-like end frames holding rollers driven by motor and gears, and a tubular centre section of variable length, which can be wheel supported.

CONVEYOR
Salzgitter Maschinen A.G.—U.K. 825779.

Coal and ore conveyor for underground use, supported on tyres or rails, to take curves down to 10 m radius, being basically of trough section.

STACKER
A. Corbin, of Paris—U.K. 825788.

A mobile conveyor for handling flat slabs, using large suction head grippers.

UNDERGROUND SHOVEL
Eimco Corporation, of Salt Lake City—U.K. 825815.

Loader shovel as tractor excavator for digging into rubble, etc., as in a mine shaft bottom, using an overhead action. The scoop has downward projecting teeth.

PIPE HANDLING
Sulzer Freres Societe Anonyme—U.K. 825822/3.

Equipment for lifting heavy pipes for joining—e.g. in hydro-electric works where pipes may be 6 to 15 ft in dia and weighing up to 18 ton. A retaining ring is clamped in pipe already set, with an adjustable projecting jib carrying a roller to hold the next section.

SKIP HOIST
Gutehoffnungshutte Sterkrade A.G., of Oberhausen—U.K. 825839.

Vertical closing device for sliding gates of skips used in mines—the aim being to avoid troubles due to different height of overwind.

MINE TRANSPORT
Stamicarbon N.V., of Holland—U.K. 825840.

Improvement on patent 725871 for a mine shaft transport indicator as a safety device to prevent tubs moving when the cage is not correctly positioned. Electromagnetic relays can stop one car of a set if the cage moves unduly during loading, etc.

BATCH LOADER
R. W. Sims, of Salt Lake City—U.K. 825843.

Pre-mixed dry concrete transfer container, held by winches and cable drums in a support frame on a vehicle chassis.

LIFT TRUCK
Sicomatic A.G., of Zurich—U.K. 825846.

Vehicle storage garage, using a dolly lift truck to handle locked cars, etc., using a given form of booms operated by compressed air.

CIGARETTE CONVEYOR
K. Korber, of Hamburg—U.K. 825889.

Endless troughed section conveyor feeding cigarette rods, from a fluted drum, being chain driven and used at high speeds.

MOBILE HOIST
A.C.E. Machinery, Ltd., of Brixton—U.K. 825954.

Tower with load carrying platform and a winch at the base, which is easily erected and has pivoted skids at the bottom.

TETRAHEDRON HANDLING
Hermorion, Ltd., of Toronto—U.K. 825970.

Method of packing layers of full tetrahedra—e.g. milk cartons, in larger boxes, from conveyors with a given system of feed of cartons from three stations to give full packing.

PULVERULENTS SCREW
Ruhrchemie A.G., of Oberhausen—U.K. 826020.

Particle drier using helical guides co-operating with gas flow to avoid agglomeration troubles.

LIFT TRUCK
Yale & Towne Manufacturing Co., of New York—U.K. 826056.

An industrial truck with adjustable gripping clamps for holding paper reels, etc., using hydraulic control and interlocks so that one does not close until the other has stopped moving.